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CONSIDERABLY ENLARGED AND IMPROVED.

BY

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BIBLIOTHECA·BODLEIANA·

AUTHOR'S PREFACE.

THE following concise account of the several diseases that fall under the province of the Physician was committed to the press, with the hope of its proving useful to students, and those practitioners in medicine who, from their professional occupations, or other circumstances, may not have it in their power to consult the more voluminous works that have contributed so much to the improvement of medicine.

The very extensive sale of the work, and its having been translated into most of the continental languages, induce the Author to believe that his labours have been generally approved.

It has been his object to compress, within a smaller compass than has hitherto been done, consistently with utility, everything which more especially deserves attention with a view to the treatment of diseases. In pursuing this design, he has discarded all theory, and retained only those leading facts with which it is absolutely necessary for a practitioner to be acquainted when he approaches the bedside of his patient.

Under distinct heads are arranged—

1. The characteristic symptoms by which diseases are known.
2. The causes from which they most frequently have their origin.
3. The circumstances that more especially point out the difference between diseases which resemble one *another.*

4. The signs which influence the judgment in forming a prognosis of their event.
5. That mode of treatment which, in the present improved state of medicine, is deemed most appropriate, and which experience has sanctioned.

The select collection of Formulæ, Glossary of Terms, and the Table showing the Doses of all valuable medicines he employed, will, the Author trusts, combine to render the volume more extensively useful.

Saville Row, August, 1823.

EDITOR'S PREFACE.

A WORK to which the familiar name of Dr. Hooper is attached must of necessity find its way into the hands of many readers. This consideration gives to the present publication an importance which its small size and unpretending character would scarcely claim for it; and it is this which induced the present Editor to undertake the task of preparing it for the press.

From the Author's Preface, it appears that the only object contemplated in the first editions of this work, was that of furnishing a concise treatise on the practice of medicine for the use of the student and practitioner. After the Author's death, however, an Introductory Part was added, containing a short outline of Physiology, Pathology, and Therapeutics, some brief directions for Clinical Examination, and a sketch of Symptomatology and Semeiology. This part, which did not occupy more than sixty-five pages, has been entirely rewritten by the present Editor.

In its present form, therefore, this work consists of two parts, corresponding to what is commonly understood by the terms General and Special Pathology and Therapeutics.

The First Part contains five chapters. The first chapter, headed "Health and Disease," consists partly of definitions and explanations of terms, and partly of practical observations on the circumstances which exert the strongest influence on the human body in its healthy and morbid state. The second chapter treats of the Causes of Death; and comprises a brief account of the leading causes registered in England, as well as of the chief modes of dying. An outline of Physiology and General Pathology forms the subject of the third chapter, in which an attempt is made to bring together some of those facts and theories that admit, either directly or indirectly, of practical application. Those functions of the

body which attract most attention at the bedside, and those methods of examination which are of most constant application, form the subjects of the fourth chapter. They are the examination of the urine; of the chest and abdomen; of the pulse and respiration; and of other symptoms and signs of disease not readily referred to either of these heads. The fifth and last chapter contains a brief outline of General Therapeutics.

Throughout this First Part, the Editor's object has been to make the work useful as a book of reference at the bedside; at the same time that he has endeavoured so to connect its several parts as to offer some inducement to the reader to study it as a whole. In this part, too, he has embodied his own original observations on the pulse and respiration.

In the Second Part, which answers to the original work, very extensive alterations have been made. Cullen's nosology has been laid aside, and an arrangement has been adopted which brings together, in separate chapters, the diseases that affect the same organs, or are otherwise nearly allied to each other.

Many liberties have been taken with the text, as it came into the hands of the present Editor. The prescriptions have been brought together at the end, and carefully arranged under distinct heads, instead of being scattered through the body of the book; many parts of the work have been so much shortened as to admit of the introduction of a great number of diseases not described in former editions; many others which were only incidentally mentioned are treated under separate heads; and a still greater number have been so much altered as to be nearly new.

Among the additions to the Second Part made by the present Editor, in the first of the six editions intrusted to his care, may be mentioned, general observations on continued fevers, puerperal fevers, plague, muscular rheumatism, neuralgia, cephalalgia; and among the diseases which underwent the greatest alteration, infantile fever, diarrhœa, hydrophobia, laryngitis, asthma, phthisis, diabetes.

In the second edition, still more extensive alterations and additions were made. Many diseases, not described in any former edition, were added; many others were materially curtailed by the omission of observations not having a practical bearing, and the work was increased by a brief description of the diseases of the eye, ear, and skin.

In the third edition, also, great additions and alterations

were made. The First Part was revised, and in more than one place re-written, extended from 163 to 209 pages, enriched with several woodcuts (chiefly illustrative of urinary deposits), and by a short account of the principal remedial measures generally embodied in the term "Hygiène." In the Second Part, several diseases were re-written; of which the most important are gangrene of the mouth, and Asiatic cholera; others were for the first time placed under distinct heads; and extensive alterations, required by the improved state of medical science and practice, were made. The Formulæ, also, were carefully revised, and received several important additions; and the several classes of Prescriptions were, for the first time, preceded by a list of all the most important preparations of the London Pharmacopœia, together with their doses. In consequence of these additions to the First and Second Parts, the third edition of the work was extended from 523 to 576 pages.

The additions and improvements made in the fourth edition were, perhaps, more extensive than those which were introduced into any former edition. Several additional woodcuts, and much new matter, were added to the First Part. Much of the new matter, and the chief improvements in the First Part, were embodied in the Chapter on the Examination of the Heart and Lungs. The changes in the Second Part consisted of some transposition of the early Chapters, and the addition of two new Chapters, the one treating of parasitic animals, and the other on the symptoms and treatment of poisoning by the three leading classes of poisons. The former of these Chapters is illustrated by woodcuts. The Formulæ, and the list of preparations of the London Pharmacopœia, were revised, and the antidotes for the poisons were added. The Glossary of Terms which existed in the original work of Dr. Hooper was also restored. The additions and alterations in this Edition extended the work from 576 to 660 pages.

In the fifth edition extensive alterations were made both in the First and in the Second Part. In the First Part, the Chapter on the Examination of the Blood was omitted, on account of the little practical importance which now attaches to the appearance of the blood as a sign of disease; and the contents of that Chapter were transferred to Chapter 3. That portion also of the third Chapter which relates to the mind in health and disease was re-written; and other additions and alterations were made throughout the First Part, by which

it was extended from 221 to 239 pages. The Second Part was enlarged by the introduction of three diseases, Cellulitis Venenata, Spermatorrhœa, and Farunculi, and by many important additions and improvements in the text of the preceding edition. The most considerable of these additions and improvements were found in the diseases belonging to the class of epidemic and contagious maladies, including Cholera, Dysentery, and Yellow Fever. In the Second Part equally with the First, however, the additional matter was out of all proportion to the increase in the number of pages. One woodcut illustrative of paralysis of the facial nerve was added.

In the present edition, the First Part has been still further enlarged by 36 pages, partly occasioned by the addition of a Chapter on the Causes of Death, partly by the enlargement of that portion of Chapter V. which relates to the Preservation of Health. The Second Part has been curtailed by a careful condensation, which has been found consistent with some useful additions, chiefly under the heads of Cachexia, Ulcer of the Stomach, and Diphtheria. The woodcuts have been subject to careful revision, and several additions have been made to their number both in the First and Second Part.

The nature of this work renders a frequent reference to authors impossible. The Editor must, therefore, content himself with acknowledging the obligations which he contracted, in re-writing the First Part, to Dr. Baly's translation of Müller's Physiology, and Dr. Day's translation of Simon's Animal Chemistry; and, in improving the Second Part, to Dr. Watson's admirable Lectures on the Principles and Practice of Physic, Dr. Robert Williams' able work on Morbid Poisons, Dr. Aitken's learned work on the Science and Practice of Medicine, and the many excellent practical treatises in the Encyclopædia and Library of Practical Medicine.

Original observations, or practical remarks, embodying the results of the Editor's own experience, are distinguished by the initial G.

WILLIAM A. GUY.

26, *Gordon Street*,
August 1858

INTRODUCTION.

THIS book is intended to be, in the widest and truest sense of the term, a practical work; that is to say, it aims at bringing together, in a small compass, and in a form easy of reference, those items of information which the practitioner would desire to possess when he stands at the bedside, or when he studies an individual case with a view to its treatment.

The first and most obvious requisite for a practitioner is the facility of recognising a disease when he sees it, of distinguishing it from others which resemble it, and of foretelling its probable course and termination. The treatment which he adopts will be judicious in proportion to the readiness with which he recognises, and the accuracy with which he discriminates diseases; and will be either rational or empirical, according as he does or does not understand their real nature and true cause.

But a facility of recognising and discriminating diseases, a knowledge of their nature and causes, of their ordinary course and termination, and of their appropriate treatment, though essential to sound and successful practice, are not the only qualifications for it. There is a vast amount of information of a truly practical character, which does not find a place in formal descriptions of individual diseases, though comprising all these particulars. Such descriptions must be regarded either as condensed histories of the more perfect forms of disease, or as abstracts of the leading features observed in the ordinary run of cases, with an occasional notice of the more remarkable exceptions to the rule; but age, sex, and original and acquired peculiarity of constitution, give rise to differences in health, or habitual departures from it, which, in a remarkable manner, affect the severity and even the character of diseases. Hence a knowledge of the mode and degree in which both health and disease are affected by difference of age and sex, and of constitution, whether original or acquired, is not less essential to safe and successful practice than is a special description of diseases themselves.

The list of the necessary acquirements of the practical physician, however, is not yet complete. It often happens that, at the bedside, great importance attaches to an individual symptom, and questions occur in relation to it, which are not, and cannot be, answered in the short space devoted to the description of the disease of which it forms

a part. The symptom may be common to several diseases, or it may be a question whether, though assumed to be a symptom of disease, it be not compatible with health. Moreover, there are many symptoms or signs of disease which are detected only by very close examination, and by the use of instruments or of chemical tests; and in using these instruments and applying these tests, many precautions are necessary that are not easily borne in mind, and with regard to which the practitioner may often require to refresh his memory.

One other consideration suggests itself in this place. No man, whatever his pursuit, deserves the name of a practical man whose knowledge and resources are limited by the experience of those who have gone before him. In all employments, and in none more than in the practice of medicine, new events and rare combinations are continually presenting themselves, which can only be understood and successfully encountered by the aid of general principles. Hence the necessity for the physician of a knowledge of pathology and therapeutics, which supply the general principles that are to guide him in treating cases of disease, or complications of which he has no previous experience.

A physician who is well versed in all these particulars may lay claim to the title of *learned* in its best sense: if he have made this knowledge his own by diligent observation at the bedside, and by the constant use of instruments and application of tests, by which alone the value of symptoms can be determined, he will have earned for himself the name of *experience;* and if to learning and experience he unite the faculty of prompt and ready use of the knowledge which he has acquired, he is truly a *practical physician.*

A very wide and comprehensive meaning is here given to the terms *learning* and *experience,* and to the phrase *practical physician.* Indeed, it is of the first importance that these words should not be used in a low and vulgar sense. It is too much the custom to call a man a practical physician because he gives no time or attention to anything but the routine duties of his profession; and to deny him that title if he devote his leisure to what are called scientific pursuits, even though these pursuits should be in immediate connection with, and have a direct bearing upon, practice. A strong conviction that no man is truly practical who is not also possessed of an extensive scientific knowledge of his profession, has presided over the preparation of this work, and has induced the Editor to extend it beyond the limits usually assigned to a so-called practical treatise.

In order fully to carry out the practical views here indicated, this work is divided into two distinct parts, of which the first embraces, in a connected form, those more general considerations that make up the sciences of General Pathology and Therapeutics, while the second contains, in a form easy of reference, a description of diseases, their diagnosis and prognosis, their rationale, and their treatment, or what is usually known as the Practice of Medicine.

The First Part is divided into five chapters, under the following titles:—1. *Health and Disease,* comprising such general observations upon either as seem to have the most practical bearing; pointing

out the way in which both are varied by age, sex, temperament, and mode of life, and concluding by an explanation of the terms in common use for distinguishing diseases from each other, and giving precision to our views and statements concerning them. 2. *Causes of Death.*—In this chapter some of the leading facts that have been ascertained in reference to the causes of death are brought together with a view of giving to the student and practitioner some idea of the relative frequency and importance of the diseases which prove fatal to human life. 3. *Outline of Physiology and General Pathology.*—In this chapter those facts and theories which have the most direct bearing upon the practice of medicine are brought together, and briefly stated, all unnecessary discussion being carefully avoided, and the more important and minute details being reserved for—4. *Examination of some of the more important Symptoms and Signs of Disease*, comprising the Urine, the Viscera of the Abdomen and of the Chest, the Pulse, and the Respiration; and 5. *An Outline of General Therapeutics*, which comprises such general principles as have been laid down for the preservation and improvement of health and the treatment of disease, together with a classification of the principal remedies, and an account of their mode of operation.

The Second Part, or the Practice of Medicine, properly so called, is also distributed into chapters as follows:—1. States of System, as distinguished from diseases properly so called. 2. Local Diseases, affecting all or several of the organs or textures of the body. 3. Febrile diseases, without essential local complication. 4. Febrile diseases, with essential local complication. 5. Febrile diseases, arising from local causes. 6. General disease (not febrile), with essential local complication.

The remainder of the diseases are distributed into eight chapters, as follows:—1. Diseases of the nervous system. 2. Diseases of the organs of circulation. 3. Diseases of the organs of respiration. 4. Diseases of the primæ viæ, organs of digestion, and chylopoietic viscera. 5. Diseases of the urinary organs. 6. Diseases of the organs of generation. 7. Diseases of the organs of sense. 8. Diseases of the skin and its appendages. 9. Parasitic animals; and 10. Poisons.

The Second Part is brought to a close by an extensive collection of Formulæ, preceded by a table of the doses of medicines; classified lists of the principal preparations of the Pharmacopœia, with their doses; and the antidotes to the principal poisons.

A glossary and an extensive index complete the volume.

PART I.

GENERAL PATHOLOGY AND THERAPEUTICS.

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6. Classification of Remedies.

THE

PHYSICIAN'S VADE MECUM.

CHAPTER I.

HEALTH AND DISEASE.

1. HEALTH admits neither of definition nor description; of none, at least, which can be applied to any useful purpose. If we define it as the integrity of every structure, and the perfect and harmonious play of every function, we give a true definition, but not a useful one. The more lengthened description in which some writers have indulged answers no better end, for it establishes no standard of comparison, and that is what we are in want of. Perfect health, like perfect beauty, is perhaps an ideal compounded of the perfections of many different individuals; or if it exist, it falls to the lot of few, and its phenomena have met with no accurate description.

2. Health, in its more usual acceptation, is a variable condition. It differs widely in different persons, and in the same person at different times. The terms "*perfect*," "*good*," "*strong*," "*robust*," "*feeble*," "*delicate*," applied to health, show how generally this difference in degree is recognised. In strict propriety of language, perhaps, there is but one condition of the human body to which the term 'health' can be applied, all others being deviations, more or less wide, from that condition; but for practical purposes, it is well to understand that there may be very great and marked departures from the ideal standard of perfect health, to which, nevertheless, the terms disorder or disease would be inapplicable.

3. But besides these differences in the degree of health, there are also differences in kind, which correspond more or less closely to peculiarities of external form, and indicate a tendency to particular diseases, or to a peculiar character attaching to all the diseases to which the person may become subject. These differences have long been recognised under the name of *Temperaments*—a term necessarily wanting

in precision, but, like many others in common use among medical men, embodying a useful generalization.

4. Four temperaments are generally recognised—the *sanguine*, the *phlegmatic*, the *bilious*, and the *nervous*.

5. The *sanguine* temperament is characterised by moderate plumpness of person and firmness of flesh. The hair is red or light chesnut, the eyes blue, the complexion fair and florid, and the skin soft and thin. The blood-vessels are large, the circulation active, and the pulse full and frequent. The countenance is animated, the movements quick, the passions excitable, the mind volatile and unsteady.

6. The *phlegmatic* or *lymphatic* temperament is distinguished by roundness of form, softness of the muscles, and repletion of the cellular tissue. The hair is fair, the eyes light blue, gray, or hazel, the skin pale, the lips fleshy, and the face and person wanting in character and expression. The blood-vessels are small, the circulation languid, and the pulse infrequent. All the functions, bodily and mental, are torpid.

7. The *bilious* temperament is recognised by moderate fulness and much firmness of flesh, with harshly-expressed outlines of the person, strongly-marked features, and decided expression of countenance. The hair and eyes are dark brown or black, and the complexion swarthy. The vascular system is largely developed, and the superficial veins are unusually prominent. The pulse is full, firm, and of moderate frequency. There is much energy of character, with great power of endurance and permanence of impressions, physical and mental.

8. The *nervous* temperament is distinguished by a small spare form, with soft and slender muscles. The features are delicate, the hair fair, and the complexion pale or slightly tinged with red; the lips thin, and the eyes light and sparkling. The pulse is small, frequent, and quick, and easily excited by mental emotions or nervous impressions. The whole nervous system, including the brain, is active, the senses are acute, the thoughts and movements quick, and the imagination lively. The health of these persons is often feeble.

9. A *melancholic* temperament is sometimes spoken of. It is nearly allied to the bilious, and is marked by peculiar calmness and seriousness of mind, with great tenacity of impressions, and a tendency to indulge in gloomy thoughts.

10. Pure specimens of these temperaments are rarely met with. In the great majority of individuals two, or even more, temperaments are found in combination, with a marked predominance, however, of one of them. To these combinations the term *mixed* or *compound* temperaments is commonly applied, and compound terms are in use expressive of the union, the predominant temperament being placed first in order. Thus we may have a *nervous-lymphatic*, a *sanguine-nervous*, or a *sanguine-bilious* temperament, the nervous element preponderating in the first, and the sanguine element in the last two cases. In some

instances the leading characteristics of the two temperaments are so distinct, that we have no difficulty in recognising the union, but in a larger number of cases they are so blended that it is difficult to say which temperament predominates. It is also by no means unusual to encounter in the purest specimens of the several temperaments remarkable exceptions to the rule; as, for instance, a pulse of 50 in a youth with all the outward characters of the sanguine temperament.

11. Each of these temperaments is liable to a different class of diseases,—the sanguine, to acute inflammation and active hæmorrhage; the phlegmatic, to congestions and subacute inflammations, to glandular and tubercular diseases; the bilious, to disorders of the digestive organs, to hypochondriasis and melancholia; and the nervous, to disorders of the nervous system, and to mental derangement accompanied by excitement.

12. Among the peculiarities of form and appearance here enumerated as combining to constitute the temperaments, there are some which claim a greater share of attention as indications of natural strength or weakness, and of liability to particular classes or characters of disease. Thus, *cæteris paribus*, the large chest is an indication of vigour; the small chest, of weakness; the thin lip, marked features, and small joints, of tone; the full upper lip, rounded form and features, and large joints, of constitutional debility.

13. There are also particular combinations generally met with in certain diseases or classes of disease, which combinations have received the name of *Diatheses*. For instance, a fair complexion, fine hair of different shades from light to dark chesnut, a blue or gray eye, long eyelashes, with a thick upper lip, is a combination very frequently met with in persons affected with scrofulous diseases; and the same combination, the thin upper lip being substituted for the thick, is as commonly met with in consumptive patients. The former may be termed the *strumous* or *scrofulous*, and the latter, the *phthisical* or *consumptive* diathesis. They are very closely allied, and are probably but very slight modifications of one and the same diathesis.

14. The term *diathesis* is also in frequent use to designate the kind or character of constitution of persons in whom the urine habitually or frequently deposits certain substances. Thus we have the terms *oxalic acid*, *lithic acid*, and *phosphatic diathesis*, applied to persons whose urine yields oxalate of lime, lithic acid and its salts, and phosphoric acid and its salts, in excess, accompanied by certain peculiarities of system and departures from health.

15. When these external differences which, under the names of temperament and diathesis, distinguish one man from another, are transmitted from parent to child, they are said to be due to *Hereditary Predisposition*.

16. That *hereditary predisposition is a real* and powerful influence *may be inferred from the resemblance* which most persons bear to

their parents or ancestors. Sometimes the resemblance extends to the reproduction of the very temperament or diathesis of one or other of the parents, coupled with a close resemblance of form and feature; but in the majority of instances, the resemblance is less exact, and is limited to some strongly-marked feature, to some deformity, or to some peculiarity of taste, temper, or talent, which may even be transmitted through several generations. The marked resemblance to each other of the members of the several royal families of Europe is a common subject of remark. The mildness and humanity of the Gracchi, the severity of the Catos, and the cruelty of the Claudian race; the factious rashness of the Guises, the irritable and unbending character of the family of Mirabeau, and the vigorous intellect of our own Gregorys, Herschels, and Pitts, furnish examples of the transmission of virtues, vices, and talents. The transmission of supernumerary toes and fingers is a familiar instance of hereditary deformity.

17. Hereditary predispositions to certain diseases are also of very common occurrence. The morbid tendencies which are most frequently handed down from father to son are those to scrofulous affections, pulmonary consumption, gout, epilepsy, insanity, and asthma. Stone, gravel, and other urinary disorders, some cutaneous diseases, and hæmorrhoids may also be mentioned among the diseases traceable to hereditary predisposition. On the other hand, a sound constitution, and a frame destined to last till a very advanced age, are blessings often handed down through several generations.

18. In extreme cases of hereditary predisposition, all or several of the children of a marriage have become subject, at or about the same age, to a particular infirmity, such as blindness, or have fallen victims to some fatal disorder, such as pulmonary consumption.

19. Hereditary diseases, as distinguished from hereditary tendencies to disease, are of comparatively rare occurrence. A very small number of children, for instance, are born with tubercles in the lungs. The occurrence of syphilis in infants whose mothers, at the time of birth, laboured under that disease, must not be regarded as an exception to this rule, as in this case the disease is not, strictly speaking, hereditary, but communicated by contact.

20. A curious but well-ascertained phenomenon, connected with the subject of hereditary predisposition, is the disappearance of a peculiarity of form, character, or morbid tendency during one generation, to appear again in the next. This has been termed *Atavism*.

21. Besides the hereditary diseases or predispositions just referred to, which may be transmitted from parent to offspring without any fault or imprudence on the part of the former, children are often born into the world of infirm constitution and prone to disease, in consequence of circumstances referable to the marriage of the parents, such

as extreme youth or advanced age, great disparity of age, or too close alliance in blood.

22. The habitual state of health of the parents, or even their state of health at the time of conception, and that of the mother during pregnancy, may also determine the constitution of the offspring.

23. An important practical inference may be drawn from what has now been stated concerning temperaments, diatheses, and hereditary predispositions—namely, that we must expect to encounter at the bedside a vast variety of constitutions, and many different degrees of vigour, and that our treatment of disease must necessarily be influenced by our knowledge of those differences. For this reason, too, it is an advantage to a patient to be treated by a medical man acquainted with his constitution; but this advantage is often estimated much too highly, and cannot compensate for even a moderate superiority in education, skill, or experience.

24. Temperament, diathesis, and hereditary predisposition, then, constitute the most marked differences between man and man; but there are other differences of more rare occurrence, and limited to comparatively few individuals, which are known as *Idiosyncrasies*.

25. There are three kinds of idiosyncrasies. The first consists in an extreme susceptibility, or the reverse, to the action of certain medicines. Some persons, for instance, are salivated by a single small dose of the mildest preparation of mercury, while others will resist a long-continued course of the same remedy in its strongest forms. The second kind of idiosyncrasy consists in the production of severe and almost poisonous effects by the most common articles of diet. Fish, fruit, vegetables, and meat, usually accounted perfectly wholesome, occasion, in some persons, marked disorder of the digestive organs, accompanied sometimes with painful cutaneous eruptions. The third class of idiosyncrasies consists in the inversion of the characteristic effects of medicines; as when opium acts as an aperient, and common Epsom salts as a narcotic. A class of mental idiosyncrasies might be added, consisting in strange preferences or aversions for objects usually deemed indifferent.

26. Besides the differences arising from temperament, diathesis, hereditary predisposition, and idiosyncrasy, which differences may exist between males or females of the same age, other and very important differences depend upon sex and age.

27. *Sex.*—The constitution of the male differs from that of the female; and this difference is strongly marked in the diseases to which each sex is liable, irrespective of those which attack the organs of generation, or spring out of the peculiar functions which the sexes have to perform. In the constitution of the male there is more tone, more strength, more rigidity, and, as a natural consequence, a greater proneness to inflammatory affections and active hæmorrhages; females,

on the other hand, have more sensibility and excitability, and a more lax and delicate fibre, with a strong tendency to nervous affections and to diseases of an asthenic character. The functions of menstruation, parturition, and lactation, also exercise a very marked influence upon the health of the female, especially in the production of nervous disorders.

28. The diseases of males are, taken one with another, of a more fatal character than those of females. Men are also more liable to suffer from accident and violence, and yield in greater numbers to the temptation of intemperance. Hence, with the exception of the interval from 10 to 35 years of age, the lower rate of mortality of females, their greater longevity, and the excess of women among the living population. Were it not for deaths in childbed, and fatal diseases of the generative organs of females, their rate of mortality would be still less, and the disproportion in the number of the two sexes still greater.

29. This difference in the mortality of males and females obtains at every period of life except the interval from 10 to 35 years of age, when the deaths of females are in excess of those of males as the numbers 55, 86, and 108 are in excess of 52, 83, and 101. The higher mortality of males is apparent even at that early age at which a difference of sex might be supposed to have the least influence. Male children under 5 years of age die at the rate of 73 in the thousand, while in the same number of female children the deaths are only 63.

30. The most important practical consideration connected with sex is, the greater liability of males to inflammatory and sthenic diseases, and of females to asthenic and nervous disorders; so that, as a general rule, if a male and female are attacked by the same disease, the former will bear depletion and lowering remedies better than the latter.

31. *Age.*—There are several important practical considerations connected with age. In infants, the gradual, and often imperfect, establishment of the function of respiration, and the consequent necessity of external warmth; in early childhood the disturbance produced by teething; and throughout infancy and childhood, the liability to disorders of the stomach and bowels, on the one hand, and of the brain, on the other. Diarrhœa, tabes mesenterica, intestinal worms, and scrofulous affections of the absorbent glands, are the diseases resulting from the activity of the organs of digestion and assimilation; and convulsions and hydrocephalus from the large development and vascular condition of the brain. The febrile exanthemata and pneumonia complete the list of the more frequent and fatal diseases of infancy and childhood.

32. As childhood passes into youth, the disorders of the alimentary canal not only become less frequent and less fatal, but they react less severely upon the brain and nervous system. Intestinal irritation ends less frequently in marasmus and hydrocephalus, and the invo-

luntary movements of chorea take the place of the more formidable convulsions of infancy. These involuntary movements are of more common occurrence in females than in males, and females continue liable to them up to a later period of life. They acknowledge as their usual cause the same intestinal irritation which often gives rise to the convulsions of infancy.

33. Towards the period of puberty, the disproportion between the head and abdomen and the rest of the body has almost disappeared, and by the twenty-first year the growth is nearly complete, though the process of ossification is not yet finished. By the twenty-fifth year, or a little later, the body attains its full growth. The interval between puberty and this period is marked by a considerable immunity from the diseases of the first periods. Disorders of the alimentary canal and of the nervous system are of rare occurrence, but idiopathic fever and inflammatory affections are frequent; and scrofula, which had previously shown itself in the form of enlarged glands and tabes mesenterica, now assumes the shape of pulmonary consumption. In the female, the disorders which depend on the imperfect establishment or suppression of the menstrual discharge are rife during this period. Of these, anæmia is the most common; but chorea and epilepsy, melancholia and instinctive mania, are occasionally to be traced to the same cause.

34. From the twenty-fifth to the forty-fifth or fiftieth year, the body remains nearly stationary, with the exception of an increasing disposition to corpulency. During the first part of this period, idiopathic fevers, inflammatory affections, and pulmonary consumption are rife; but towards the fiftieth year, congestion begins to take the place of inflammation, and apoplexy is henceforth a common and rapidly-increasing cause of death. In the female, the interval from forty to fifty, with the years preceding and following, is marked by the cessation of the menstrual discharge, and the strange nervous affections which often accompany the change of life.

35. From fifty to sixty years, the body begins to show symptoms of loss of power and sluggishness of function, the prelude to that slow decay of which the progress is indicated by diminished sensibility, impaired memory, muscular weakness, scanty secretions, calculous affections, osseous deposits, organic diseases of the principal viscera, and malignant degenerations.

36. From this enumeration of the prevalent diseases of different periods of life, it will naturally be inferred, that the risks to which persons of different ages are exposed, as measured by their mortality, differs very considerably; to what extent the following statements will show:—The period most fatal to life is the first year, during which no less than one-fourth of all the recorded deaths takes place. During the four succeeding years, also, the number of deaths is so considerable, that the 25 per cent. of the first year becomes for the first five years 42 per cent. By the completion of the

fifteenth year, the deaths amount to nearly one-half of the whole number of deaths. During the forty years which elapse from the age of 15 to the age of 55, rather more than a fourth part of all the deaths takes place, each decade contributing in nearly equal proportions to the aggregate result. By the end of the fifty-fifth year, three-fourths of the population have succumbed. From 55 to 85, an aggregate of 23 deaths in the hundred, or nearly another fourth, takes place; the ten years from 65 to 75 being the period of the greatest number of deaths. Two per cent. of the entire mortality remains to be accounted for by the deaths which take place after 85 years of age.

37. The following is a condensed view of the distribution of the deaths according to age:—

Under 1 year	25	deaths	in 100.
„ 5 years	42	„	„
„ 15 „	49	„	„
„ 55 „	75	„	„

Or, if the whole mortality is distributed into four equal parts, it will take place in unequal times, thus:—

Under 1 year	one-fourth.
1 to 15 (14 years) . . .	one-fourth.
15 to 55 (40 years) . .	one-fourth.
55 and upwards . . .	one-fourth.

38. The statements just made relate to the number of deaths registered at the several periods of life given in the tables; but as the number of persons living at each of the periods in question differs very widely, these figures do not display the risk to life from disease and from other causes to which persons of different ages are subject. This risk is shown in the following table, in which, on account of the different rate of mortality prevailing in the two sexes, males are distinguished from females.

Out of 1000 males and 1000 females living at each of the ages specified in the table, the number of deaths placed opposite to those ages occurs, one year with another, among the English population—

Ages.	Males.	Females.
Under 5	74	63
5 to 10	9	9
10 „ 15	7	5
5 „ 15	7	7
15 „ 25	8	9
25 „ 35	10	11
35 „ 45	13	13
45 „ 55	19	16
55 „ 65	32	29
65 „ 75	68	61
75 „ 85	150	137
85 „ 95	303	281
95 and upwards	452	452

39. The column of figures which represents the rate of mortality of females shows a curious approach to regularity of increase in the five decades from 5 to 55, and in the six decades from 45 to the end of life; the mortality in the first series of decades being nearly as the numbers 7, 9, 11, 13, 15, while that in the last series is not very remote from the series 15, 30, 60, 120, 240, 480. It may therefore be stated, as a rough approximation to the truth, that from the fifth to the fifty-fifth year the rate of mortality increases by about 2 in the 1000 every ten years; and that after the fifty-fifth year the rate of mortality doubles every ten years. It may be well to repeat that this general statement is less strictly accurate in the case of males than it is even in the case of females.

40. It is important to understand that between persons of the same sex and age there are very appreciable differences: that, in other words, the same age does not represent the same degree of growth, or the same perfection of function. These differences are well illustrated in the female by the variable time of occurrence of certain constitutional changes characterised by the appearance or suppression of the menstrual discharge. Observations on a very extended scale have shown that while the most usual age for the first appearance of the menses is the fifteenth year, that event may happen at any age from eight years to twenty-five. In very rare instances it has occurred earlier than the eighth year, and even in the very first year of life. So also with the period of suppression of that discharge. It may disappear at any age from thirty-five years, or even earlier, to fifty-six years, or later; and it may recur at very advanced periods of life.

41. Another very important consideration in regard to age relates to the fatality of the same disease at different periods of life. As age advances, the structures of the body undergo changes which render them more and more prone to disease, at the same time that they lose the power which they possess in so great a degree in early life, of self-restoration. Hence the great simplicity of the diseases of childhood, and the success attendant upon their treatment, when compared with those of more advanced periods of life.

42. This general principle is well illustrated by the special case of the mortality from fever at different ages. It is well known that, in the majority of cases, fever proves fatal by setting up inflammation in some important organ of the body, as the lungs, the bowels, or the brain. The mortality from fever may therefore be expected to keep pace with, and to be a measure of, the liability of the several organs of the body to fall into a state of disease, and to increase as the power of self-restoration diminishes; and the calculations founded by Mr. Finlaison on the experience of the London Fever Hospital fully confirm this expectation. If we suppose 100,000 patients to be attacked with fever, at each of the ages specified in the following table, the mortality will be represented *by the figures in the column* of deaths:—

Age.	Deaths.
5 to 16	8,266
15 „ 26	11,494
25 „ 36	17,071
35 „ 46	21,960
45 „ 56	30,493
55 „ 66	40,708
66 and upwards . .	44,643

The risk to life from fever is therefore more than twice as great at 30 as at 10; nearly twice as great at 40 as at 20, and at 60 as at 40; it is nearly five times as great at 60 as at 10, and nearly four times as great above 65 as at 20. Similar results have been obtained for the febrile exanthemata, which, like fever, originally affect the whole body, but in their progress attack individual organs; and for dysentery as it attacks our troops in unhealthy stations, or under unwholesome circumstances, abroad.

43. The liability to sickness, and the duration of it when it occurs, also increase with age. This is shown in the following table, which is altered from a valuable abstract, by Mr. Neison, of the results of a large number of returns from English and Scotch Benefit Societies.

Age.	Per Centage of Members Sick during each Year.	Sickness per Annum among those actually Sick, expressed in Weeks.	Mortality per Cent. among those actually Sick.
11—15	21·9	4·1	1·0
21—25	22·0	3·8	3·1
31—35	21·0	4·4	3·8
41—45	23·0	5·9	4·5
51—55	27·6	8·5	6·2
61—65	35·6	15·2	8·6
71—75	58·4	32·3	12·1
81—85	74·5	37·8	18·4

44. The differences occasioned by temperament, diathesis, hereditary predisposition, sex, and age, are still further extended and exaggerated by climate, place of abode, occupation, habit, and mode of life. Some of these influences demand especial notice, in consequence of their bearing upon practice.

45. The most powerful of these influences is the atmosphere, which not only affects the entire surface of the body by variations in its temperature, pressure, and hygrometric and electric condition, but, by its contact with the skin and internal surface of the lungs, produces the most important chemical changes in the blood, and through it in the system at large. A variety of subtle poisons, of which some are eliminated from inorganic matter, others generated by animal and

vegetable decomposition, and a third class given off from diseased living bodies, are also held in suspension in the air. All of these, in a state of concentration, may give rise to fatal accidents, or to severe diseases; but when diffused in smaller quantity through the air, they modify the state of health, and impair the tone of the system. Other substances—such as smoke, dust, and metallic particles, given off during certain chemical or mechanical operations—also tend to impair the functions of the skin and lungs, and may become the source of fatal maladies.

46. The temperature, moisture, pressure, and electric condition of the air, variously modified and blended by situation, soil, and physical conformation of the surrounding country, constitute *climate*, of which the prolonged effect upon the frame is seen in the form and features of the body, as well as in the condition of its several functions. Some of these conditions of the atmosphere are deserving of separate notice, as having a marked influence upon health.

47. The *temperature* is by far the most important; for it results from actual observation on the large scale that in temperate climates, the amount of sickness among a population increases as the temperature rises, while the mortality is greatest when the temperature falls to the lowest point. A hot summer is therefore very sickly, and a cold winter very fatal to life. The less mortal sicknesses of summer prevail in the shape of diarrhœa, cholera, dysentery, and febrile affections, among the young and middle aged; the more mortal maladies of winter in that of pneumonia and bronchitis among infants and aged persons. As a high temperature promotes putrefaction and decay, it is obviously favourable to diseases dependent upon atmospheric impurity. This circumstance accounts for the fact, that in former times, when our towns were in a much more filthy state than they are now, sickness and mortality were both at their height in summer; and one result of the improved sanitary state of our crowded population is to shift the maximum mortality from the summer to the winter months. The hotter months of the year, however, still continue to be more fatal to life than the months of intermediate temperature.

48. The facts which have been ascertained respecting the influence of temperature on the occurrence of fatal maladies admit of being briefly stated. If we divide the year, in the usual manner, into four equal quarters of three months each, we obtain, for England, the following results:—

1. January, February, March	. .	25 deaths	per 1000.
2. April, May, June	. . . .	22 „	„
3. July, August, September	. .	20 „	„
4. October, November, December	.	21 „	„

49. If the twelve months are so grouped as to correspond more closely with the four seasons of the year, the mortality, for London, is represented approximately by the following figures:—

Winter (December, January, February) . .	16 deaths.
Autumn (September, October, November). .	15 „
Summer (June, July August)	14 „
Spring (March, April, May)	14 „

50. If a still better distribution of the twelve months is made, into the four hottest, four coldest, and four temperate months, we have, for London, the following numerical proportions:—

Four coldest months (Dec., Jan., Feb., March)	21 deaths.
Four hottest months (June, July, Aug., Sept.)	19 „
Four temperate months (April, May, Oct., Nov.)	18 „

So that, in whatever way the months of the year are grouped, the coldest months are most fatal to life; while, as appears from the last comparison, the aggregate of hot months ranks next in order of fatality, the months of intermediate temperature being the least fatal.

51. The effect of a low temperature in destroying life is strikingly shown by a comparison made in one of the Reports of the Registrar-General between the deaths in ten consecutive cold days in the months of November and December, 1856, and ten warmer days preceding and following them. The ten cold days had a mean daily temperature of 34°, and a mean nightly temperature of 27°; and the ten warmer days a mean daily temperature of 51°, and a mean nightly temperature of 47°. In the ten colder days there died of consumption 232, of bronchitis, pneumonia, and other diseases of the lungs 502, of diseases of the heart 73, of diseases of the brain 170, and of other diseases 867. In the ten warmer days, the deaths by the same diseases, in the same order, were 163, 394, 51, 172, and 725. In consumption, bronchitis and other diseases of the lungs, and heart-disease, therefore, a fall of about 28 degrees of temperature gave an excess of deaths in the ratio of 23 to 16, 50 to 39, and 73 to 51. If all causes of death are taken together, the deaths in the colder are to the deaths in the warmer days as 18 to 15.

52. But the influence of temperature in promoting disease and undermining health is most distinctly displayed in the diseases which attack the inhabitants of temperate climates when residing in countries strongly contrasted with their own; and as they affect in a less degree the indigenous populations. The countries within the tropics, or bordering upon them, are scourged by intermittent and remittent fevers of the most severe and intractable types, by yellow fever, by diarrhœa, dysentery, and cholera, and by diseases of the liver; while the countries verging on the North Pole are especially subject to catarrhal affections, to influenza, to diseases of the organs of respiration, and to scurvy; and the countries in the temperate zone, between the tropical and polar zones, to fevers of the continued type, to typhus fever, with intermittent and remittent fevers of a more tractable character, to pulmonary consumption, to rheumatism, and to cutaneous diseases of great variety of character, and often of great severity.

53. The diseases most prevalent in the several regions of the globe

also prevail in countries which share with them a similar temperature; so that isothermal lines are, in a general sense, lines of disease also. The diseases, for instance, which have been pointed out as incident to countries in or near the tropics prevail along the equator of heat, or mean annual isothermal line of 82·4° Fahr.; and in and near all that zone or region which is bounded north and south by the isothermal line of 68°; while the diseases of the temperate zone occur in the countries lying on or near the isothermal lines of 50°; and those of the polar zone or region on or near the isothermal line of 41°. It may be useful to trace the course of these three isothermal lines, and to mention the countries or cities which they traverse or touch :—

(1.) The isothermal line of maximum temperature, or equator of heat, traverses or passes near the southern coast of the Gulf of Mexico, the Gulf of Guinea, the Straits of Bab-el Mandel, and the fortress of Adin, the southern point of Hindostan and the city of Madras, and the islands of Sumatra and Java.

(2.) The northern isothermal line of 68° traverses California, skirts the north coast of the Gulf of Mexico, touches the island of Madeira, the fortress of Gibraltar and the city of Algiers, passes along the south coast of the Mediterranean, and passes through China at the latitude of Nankin.

(3.) The southern isothermal line of 68° traverses South America, from Potosi to Santa Fé, touches the Cape of Good Hope, and cuts off all that southern portion of Australia which has become the home of English colonists.

(4.) The northern isothermal line of 50° touches New York and the southern point of Ireland, traverses the northern coast of the Black Sea, the Caspian, and the Sea of Aral, and passes between the northern and southern islands of Japan.

(5.) The southern isothermal line of 50° traverses the southern point of South America, runs north of the Falkland Islands, south of Van Diemen's Land, and cuts off the southern angle of New Zealand.

(6.) The isothermal line of 41° touches Quebec, the south coast of Iceland, Stockholm, and Moscow, cuts in half the northern island of Japan, and runs south of the peninsula of Kamtschatka.

54. This brief statement of some of the chief points of the earth's surface touched by the chief lines of equal temperature may serve to direct attention to the influence of the important element of heat in the production of disease. It must, however, be borne in mind that the diseases mentioned as specially incident to the several zones may pass beyond the limits thus roughly assigned, whenever, from local causes, the temperature is raised or lowered, or when, the mean annual temperature being little raised or lowered, the summer is unusually hot or the winter unusually cold. In the one case, the diseases of the temperate zone may assume the character usually belonging to the diseases of the tropical zone; in the other, they may approximate more closely to those which prevail among nations living nearer to the pole.

55. It must also not be forgotten that the diseases mentioned as prevailing in the several zones are not wholly due to temperature. Thus scurvy, which is a very prevalent and fatal disorder in countries situate in the polar zone, may be traced in part to cold, and in part to the imperfect diet which the cold itself is the means of imposing upon the inhabitants; and it is well known that a diet deficient in vegetables may occasion scurvy in any part of the world. Again, the severe and fatal diseases of the tropical zone are not traceable solely to a high temperature, but to heat acting upon and developing the miasma of damp and rank soils. Troops, therefore, and bodies of men, may always be encamped on dry spots in the most unhealthy districts, and, in the absence of any material decrease of temperature, escape, to a great extent, the prevailing maladies. By the discovery and use of such spots alone can the inhabitants of temperate climates hope to maintain their hold on their possessions in countries having a higher temperature than their own.

56. The influence of *moisture*, as distinguished from that of the poisonous emanations from the soil which it promotes, is not so readily traced as that of temperature. There is reason, however, to believe that the inhabitants of damp soils and low-lying districts have less vigour than those who inhabit gravelly and sandy soils and the summits of hills and mountains. Experience also proves that many invalids suffer most when the air is loaded with moisture.

57. It is a notorious fact, however, that excessive humidity generally coexists with a high temperature in climates and regions most fatal to human life, as on the southern coast of Africa, the Sunderbunds of Bengal, and the deltas of rivers, marshy spots, and jungles, at all seasons within and near the tropics, and in many spots in more temperate regions during the heats of summer.

58. *Atmospheric pressure* also has its effect upon health, and many invalids are susceptible even of slight changes in this respect. The oppression experienced in the diving-bell, the diarrhœa incident to those who remove to residences in very lofty situations, and the hurried respiration, quickened circulation, and tendency to hæmorrhage which accompany the ascent of high mountains, are illustrations of the more extreme effects of increased or diminished atmospheric pressure.

59. The influence on health of the *electric condition* of the air has not yet been clearly made out. The very small quantity of electricity which has more than once been detected in the atmosphere of places in which the Asiatic cholera was raging, is one of the most remarkable coincidences yet discovered.

60. It has also been shown that the quantity of *ozone* (a modification of oxygen occasioned by repeated electrical discharges, and characterized by a peculiar penetrating odour and an increased power of oxidation) bears a striking relation to the prevalence of certain

diseases, having been observed to be in defect during the prevalence of intermittent fever and of cholera, and in excess during at least one epidemic of influenza.

61. But in addition to the more obvious and appreciable changes in the state of the atmosphere, there are other changes which are known to us only by their effects. The Asiatic cholera, for instance, has in the experience of the present generation, on three occasions overstepped its usual limits, and spread over the greater part of the habitable globe; and the entire class of infectious and contagious maladies exhibits variations in intensity from year to year which cannot be explained by differences of atmospheric temperature, moisture, and pressure, nor even by variations in the electric condition of the air, and in the proportion of ozone. We are obliged, therefore, to believe in the existence of other and more obscure modifications in the condition of the atmosphere, which modifications are sometimes designated as '*Epidemic Constitutions.*'

62. Although we are unable to define or explain these atmospheric conditions, we are able to form some idea of the amount of the influence which they exert, by comparing the annual fluctuations in the number of deaths due to infectious and contagious diseases, such as small-pox, measles, scarlet fever, and typhus fever. Thus, in the fifteen years from 1840 to 1854 inclusive, the annual number of deaths from small-pox taking place in London, in a million of inhabitants, was as low as 87, and as high as 890; from measles, as low as 249, and as high as 1122; from scarlet fever, as low as 354, and as high as 2132; from hooping-cough, as low as 582, and as high as 1217; from influenza, as low as 35, and as high as 562; from erysipelas, as low as 113, and as high as 260; and from typhus fever, as low as 615, and as high as 1600.

63. The extent of these variations will appear the more remarkable when they are contrasted with the very slight differences in the annual rate of mortality of many other diseases, especially those which depend primarily upon structural changes. The deaths from pulmonary consumption, for instance, in the same years and among the same number of persons, fluctuated between the numbers 2645 and 3941; from inflammation of the lungs, between 1340 and 2169; from cancer, between 253 and 432; and from apoplexy, between 426 and 607.

64. A still more vivid idea is afforded of the extent of these fluctuations by the fact, that no combination of causes within or beyond human control gives rise to such considerable annual variations. Neither the weather, nor the number of shipwrecks, nor the imports or exports of commodities, nor the prices of food or funds, is subject to such fluctuations from year to year.

65. It is also well worthy of remark that these peculiar states of atmosphere, whatever they *may be, do not* affect all diseases of an infectious *or contagious nature in the same* degree; for the sma[l]

number of deaths from small-pox, from erysipelas, and from measles, and the largest number of deaths from small-pox and from influenza, occurred in years in which no other of the diseases just mentioned attained their highest or lowest numbers; while the least number of deaths from influenza coincided with the greatest number from measles; and the least number from typhus fever with the greatest number from hooping-cough. On the other hand, the least number of deaths from scarlet fever and typhus coincided in the year 1841, and the greatest number of deaths from scarlet fever, typhus fever, and erysipelas in 1848. But the epidemic visitations of cholera occurred in years marked by no peculiar excess or defect of any of the diseases of which mention has just been made.

66. The contamination of the air is a most efficient cause of modifications in the state of health, as well as a prolific source of disease. The pure air of rural districts is subject to contamination by the exhalations from stagnant pools and marshes, which, when they do not produce actual disease, have a morbid influence on the general health of the inhabitants. But the air of large towns is subject to still greater pollution by the gases given off from the body itself, the decomposition of animal and vegetable substances, the refuse of manufactories, the smoke resulting from the imperfect combustion of fuel, and the dust created by constant traffic.

67. These impurities in the air of large towns, existing both within and without the dwellings of their inhabitants, tend to modify the state of health of those who are reputed healthy, and to render them liable to a class of diseases distinguished from those of rural districts by an absence of power or tone, no less than by the different and even opposite treatment which they require. Thus a disease, which in the country will bear and require bloodletting, will, in large towns, scarcely admit of any amount of depletion, and may even demand an opposite mode of treatment. This depressing and debilitating effect of the atmosphere of large towns, displayed in the pallid aspect of those who are esteemed healthy, and in the want of power accompanying the diseases to which they are subject, is a fact of great practical importance, and one which ought always to be borne in mind at the bedside.

68. The debilitating effect of a residence in large towns is most apparent in that class of the inhabitants which follows its employments within doors, and which, in addition to the impure air of the town itself, is exposed to the close and heated atmosphere of shops and workshops, often combined with an absence of the wholesome stimulus of light. These persons exhibit, in an exaggerated form, the peculiar influence of a town life, and their diseases are marked in a still greater degree by want of power. There is as much difference between the indoor and outdoor labourers of large towns as there is between the inhabitants of the town and of the country. A difference of a less marked kind is also to be observed between those who lead a sedentary

life within doors, and those whose indoor employments require a greater amount of exertion.

69. A residence in large towns, then, tends to reduce the strength and vigour of the frame, and predisposes to diseases characterised by want of tone and power; and this effect is more marked in persons employed within doors than in those working in the open air, and in the sedentary than in those using greater exertion.

70. In the case of many of the inhabitants of large towns who follow indoor employments, another depressing and exhausting influence is often superadded to those just enumerated, viz., long hours of work or service, often extending far into the night, and sometimes usurping almost all the time which ought to be devoted to sleep. The London bakers during the whole of the year, compositors during the session of Parliament, and milliners and dressmakers during the fashionable season, suffer greatly from this cause.

71. The injurious effects of the polluted atmosphere of large towns may be inferred from the excessive mortality of their inhabitants as compared with that of rural districts. Thus, while the annual mortality of rural districts in England and Wales varies from 18 to 22 in the thousand, that of town districts, not being the seats of manufacture, will often amount to 25 in the thousand; and that of populous manufacturing towns and crowded sea-ports to 35 in the thousand, or even more. The mortality in some continental capitals exceeds 40 in the thousand. The very highest of these rates of mortality is exceeded in certain unhealthy districts of almost all our large towns.

72. But when the necessary element of the ages of the living population is taken into account, these marked differences in the longevity of the inhabitants of town and country, and of the best and worst districts of the same town, are brought within much narrower limits.

73. It must not, indeed, be supposed that the rural districts enjoy an absolute immunity from the causes of disease which impair the vigour and shorten the lives of the inhabitants of towns. Defective drainage and natural obstacles to the free movement of the external air often combine with overcrowding and neglect of cleanliness within doors, and a scanty and unwholesome diet, to counteract the beneficial influence of wholesome labour in the pure open air of the country, and so impair the strength as to predispose to diseases of the low type prevalent in crowded city populations. Overwork, also, is not an evil limited to town populations.

74. It should also be borne in mind that many country places share, with the least healthy portions of our large towns, the evil of a rich and ill-drained soil. Many a small village or isolated house in the country, like the southern district of London, or the old town of Liverpool, stands on a swamp between a river or stream and a range of hills or rising ground; and *invites a visit* from every pestilence which happens *to prevail.*

75. The diseases which cause the high mortality of town populations are, in accordance with what has been just stated, the scrofulous affections of children, and the pulmonary consumption of the adult, together with febrile diseases and exanthemata characterised by an unusual tendency to the typhoid or adynamic form. The dust and smoke suspended in the air of large towns also give rise to diseases in the lungs, which exist in their most severe and fatal form among the knife-grinders of Sheffield.

76. Next to impurity of air, as a cause of diminished health and vigour, comes scanty or unwholesome food. An insufficiency of nourishment is one of the most influential causes of that want of power and tone which have been pointed out as marking the inhabitants of large towns, and of some of the least favoured of our rural districts. In infancy and childhood, again, a diet not merely unequal to the wants of the frame, but unsuitable to the age, or destitute of some essential element of the growth of the body, often sows the seeds of future weakness and disease. At all ages, too, the poorer part of our population is peculiarly exposed to the danger of unwholesome food, or is forced by sheer destitution to live on a diet wanting in the requisite variety of elements. Hence land scurvy and other allied diseases.

77. A still more fatal cause of debility and disease is the abuse of spirituous liquors, to which the inhabitants of large towns are peculiarly addicted. Its effect on health is seen in the pallid and sodden aspect of the drunkard; its influence on the character and course of disease in the fatal effects so often attending the slightest injuries in brewers' draymen and others addicted to habits of intemperance; and its agency in shortening life by facts which it may be well to state somewhat in detail.

78. It has been ascertained that in men peculiarly exposed to the temptation of drinking, the mortality before thirty-five years of age is twice as great as in men following similar occupations, but less liable to fall into this fatal habit. It has also been shown that the rate of mortality among persons addicted to intemperance is more than three times as great as among the population at large. At the earlier periods of life the disproportion is still greater, being five times as great between 20 and 30 years of age, and four times as great between 30 and 50. The annual destruction of life among persons of decidedly intemperate habits has been estimated at upwards of 3000 males and nearly 700 females, in a population of nearly 54,000 males and upwards of 11,000 females addicted to intemperance. The greater number of these deaths are due to delirium tremens and diseases of the brain, and to dropsical affections supervening on disease of the liver and kidneys.

79. This extensive prevalence of intemperance among the English population should be borne in mind, especially as no fact is better established than that diseases occurring in constitutions which have been impaired by excess require a peculiar treatment. Intemperate

persons not only bear depletion worse than other inhabitants of large towns, but they even require the opposite mode of treatment.

80. Luxury, too, like intemperance, tends to undermine health and shorten life. Hence the higher orders are short-lived, and, we may therefore safely infer, unhealthy while they live. Our agricultural labourers, in spite of the many disadvantages to which they are exposed, are much longer lived than any of the higher classes; and the aristocracy are nearly on a par with the members of benefit societies in Liverpool, the unhealthiest city in England. Of the classes, too, which enjoy the most ample means of self-indulgence, those are the most unhealthy which possess these means to the greatest extent. Thus the gentry are more healthy than the aristocracy; the aristocracy, than the members of royal houses; and these last more healthy than crowned heads. Those who occupy the highest place in the social scale are probably, in point of health and longevity, but little raised above the very meanest of their subjects.

81. With the exception of the hardships to which the very poorest and most destitute members of society are exposed, there is no more fruitful source of disease than inactivity of mind and body. In wealthy communities the number of persons who have no occupation of sufficient importance to interest and occupy the mind is always very great; and such persons constitute a large proportion of the class of habitual invalids, who are constantly in need of medical advice.

82. But while the unfortunate possession of wealth, unpurchased by exertion, tempts young men to sloth, luxury, and dissipation, and older men to less active self-indulgence, poverty exposes other classes of the community to similar evils. Thus the soldier, in time of peace, suffers from the ennui of insufficient employment, is strongly tempted to indulge in dissipation, and is exposed, at the same time, to the evils of overcrowded and unwholesome barracks; and with him, too, disease is busy and life short. Confinement, and the absence of such employment as is calculated to interest and excite the mind, also undermines the health of the prisoner, whose position, in all other respects, is so much superior to that of the soldier, and of the pauper, who shares with him some of the evils of overcrowding and defective sanitary arrangements. Recent inquiries have proved that the life of the soldier in time of peace is greatly shortened by the causes now specified; the prisoner is also known to suffer thereby; and it is also highly probable that for the units of lives which poor-laws save by averting starvation, hundreds are sacrificed by the imprisonment they inflict.

83. The enumeration of the causes of the wide differences existing between individuals reputed healthy, or not actually suffering from some well-defined malady, would be incomplete if no notice were taken of that strange and inexplicable change which is wrought in the body by attacks of *diseases belonging to the* class of contagious or

infectious maladies, and especially that division of the class known as the febrile exanthemata, which change consists in a complete immunity from, or greatly diminished liability to, a second attack of those diseases. A similar result is brought about in one instance by a diseased condition nearly allied to, but not identical with, the disorder from which the body is protected. The instance in question is the disease set up by vaccination as a preventive of small-pox.

84. The general result of the foregoing considerations respecting health, and the differences which exist between one individual and another, may be thus summed up:—There are many original and many acquired differences between man and man. The original differences are those conveyed by the terms temperament, diathesis, hereditary predisposition, and idiosyncracy; to which we may add those dependent upon sex and age. The acquired differences are due to climate, place of abode, employment, diet, and mode of life; and, in certain instances, to diseases previously undergone. In speaking of age, it is also important to understand that the same age does not imply the same degree of growth or development; and that even those functions which would seem to be most important to the health and vigour of the frame, present a wide latitude in the time of their appearance and disappearance.

85. When, therefore, we take into consideration the original and acquired differences which distinguish man from man, and the various and complicated influences to which the body is exposed in all states of society, but especially in highly-civilized communities, no additional argument will be necessary to establish the first great principle on which much of the practice of medicine hinges—*that in health, and (by natural inference) in disease, every function of the body varies within wide limits of intensity.* This fact is the key to the imperfection of medicine as a science and its difficulty as an art.

86. DISEASE.—To define disease we must first have defined health, for the one is but the negation of the other. In like manner, the description and right understanding of disease depends upon the description and right understanding of health. Without attempting a formal definition of disease, it will be sufficient to state, that disease is present when any structure of the body is changed (provided that change be not the direct and immediate effect of external injury), or when any function is either unnaturally active, or torpid, or altered in character.

There is one distinction of great practical importance which may be properly insisted upon in this place: it is a distinction between disease, structural or functional, and those unhealthy *states of system* which are brought about by the prolonged operation of the causes enumerated in § 66 to 82. Previous to becoming the subject of any well-defined disease, the constitution may have been brought, by the continued action of one or more of these causes, into a state which shall cause the disease itself to assume a more or less severe form, and

even to depart in some respects from its usual character and course. Much of the success of a physician's practice will depend upon his recognising these *states of system*, as well as the several individual peculiarities already pointed out, as modifying the disease which is under his treatment.

87. Diseases vary much (*a*) in their nature; (*b*) in their form or type; (*c*) in their duration and course; (*d*) in their terminations; (*e*) in their causes; and (*f*) in their mode of occurrence.

(*a*) *Structural.*—Consisting in some alteration of structure.

Functional.—Consisting in disordered function.

Common.—Presenting the more usual characters of common inflammation, &c.

Specific.—Peculiar, or departing from the common character. Thus, syphilis and scrofula are specific diseases.

Malignant.—Structural diseases for which no remedy has yet been discovered, and which spread from texture to texture: as cancer. Diseases which assume a very dangerous and intractable character are also termed malignant: as malignant cholera, malignant typhus, malignant scarlet fever.

Idiopathic.—Not dependent upon any other disease.

Symptomatic.—Dependent upon, or being a symptom of, some other disease.

Primary.—The first in a succession of diseased conditions; for instance, a primary venereal sore.

Secondary.—Following after or upon some other disease; for instance, secondary syphilis.

88. (*b*) *Continued.*—Running their course without interruption in their symptoms.

Intermittent or Periodical.—Interrupted by intervals of health.

Remittent.—Having an alternate augmentation and diminution, but no complete cessation of their symptoms.

89. (*c*) *Acute.*—Of short duration and great severity.

Chronic.—Of long duration and slight severity.

These may be combined, as in intermittent fever, which is *chronic* in duration and *acute* in severity. Again, one may run into the other, the acute subsiding into the chronic, and the chronic being heightened into the acute. In one instance, the terms *acute* and *chronic* have been incorrectly used to mark merely the severity of disease; thus articular rheumatism or rheumatic fever is called *acute* rheumatism, and rheumatism of the muscles is called *chronic* rheumatism.

Sthenic.—Nearly synonymous with acute: marked by vigour and excitement.

Asthenic.—Characterised by want of vigour, and nearly synonymous with the words *typhoid* and *adynamic*.

90. (*d*) Most diseases terminate in complete recovery; a considerable number in partial or incomplete recovery; and one attack of illness in each person fatally.

Recovery from disease, even when complete, is generally a gradual process, and the time occupied by it is termed the period of *convalescence*; but in certain cases the transition from disease to health is rapid and even sudden.

The diseases from which recovery takes place slowly, are mostly those which have exhausted the patient's strength by the severity of their attack, and their long duration; such as fevers, acute inflammations, exhausting discharges, and paralytic affections. The diseases from which recovery is sudden or rapid are chiefly neuralgic affections, and diseases dependent upon mechanical causes, such as gall-stones, or calculus in the ureter.

Sometimes diseases terminate by profuse discharges, eruptions, or external inflammations, giving instantaneous relief. Such terminations are termed *critical*, or they are called *crises*. Observation, both in ancient and modern times, seems also to have proved the existence of *critical days*, that is to say, of days upon which febrile disorders are prone to take a favourable turn.

Another termination of disease is in *relapse*, a common event in one form of continued fever; another termination is by *metastasis*, or transference from the part first attacked to some other part, as from the joints to the stomach, heart, or brain, in gout; another termination is by extension of the morbid state to a texture similar to the one originally attacked, as is the case when acute rheumatism having commenced in the fibrous textures surrounding the large joints, seizes upon the fibrous textures in and about the heart.

91. (*e*) *Contagious and Infectious.*—These terms are now used synonymously to designate diseases communicated from one person to another. If employed in accordance with their derivation, the first would mean "communicated by contact," the second, "conveyed through the air without contact."

Hereditary.—Transmitted from parent or ancestor to offspring or descendant.

92.—The causes of disease may be divided into *external* and *internal*. Among external causes may be mentioned mechanical injuries; chemical agents applied to the body, inhaled, or swallowed; heat and cold. The chief internal causes are an unwholesome or defective diet; violent bodily exertion; intense and prolonged mental application, violent emotions, and depressing passions; dissipation and sexual excesses; increased or suppressed evacuations, and various structural changes brought about by the slow operation of natural agents on a system predisposed to them.

93. (*f*) *Epidemic.*—Attacking a number of persons at the same time, and recurring at irregular intervals; as fever and small-pox. Some diseases, as cholera and influenza, spread from place to place with great rapidity, and attack at or about the same time the inhabitants of whole continents.

Endemic.—Peculiar to certain localities, as ague, goitre, elephanti-

asis, &c. The same disease may be both epidemic and endemic: thus, typhus fever, which is endemic in certain districts of large towns, is epidemic in those districts in certain seasons or years; cholera again is endemic in India and epidemic in Europe.

Sporadic.—Attacking one individual at a time. In this sense the term is sometimes applied to epidemic and endemic diseases when they attack one or two persons only, in which case they are said to occur *sporadically*. Such sporadic attacks are common at the beginning and at the end of epidemics.

Zymotic.—From a Greek word signifying ferment, is now used to characterise the entire class of epidemic, endemic, and contagious diseases. The term is convenient as grouping together diseases which are allied by the similarity of their predisposing causes, but open to objection as based upon a mere hypothesis which is obviously inapplicable to the cases of sudden death due to the operation of atmospheric and other poisons.

94. *Names of Diseases.* (Medical nomenclature.)—No uniform plan has hitherto been pursued in giving names to diseases. By far the greater number have been named from some prominent symptom, as fever (from *ferveo*, to burn), hydrophobia, diabetes. Other diseases have been named from their seat and nature combined, as hydrocephalus, water on the brain. The nature of a large class of these diseases is indicated by the termination of the words themselves, as pericarditis, pleuritis, iritis, inflammation of the pericardium, of the pleura, of the iris, the first part of the word indicating the part affected, and the termination *itis* denoting the nature of the disease, viz., inflammation. Recent attempts have also been made to substitute for words in common use more philosophical terms descriptive of the nature of the existing disease. Thus it has been proposed to substitute the term hyperæmia (excess of blood), qualified by the words general, local, active, passive, &c., for plethora, inflammation, and congestion; and anæmia (defect of blood), similarly qualified, for chlorosis, &c. To many of these innovations it may be objected that it is yet premature to use words which imply an accurate knowledge of morbid conditions, and that for some time to come it will be better to continue the use of those terms with which the profession is more familiar.

95. *Classification of Diseases.* (Nosology.)—The same objection applies to all philosophical systems of nosology which lies against innovations in the use of terms; namely, that we are not yet prepared to construct a philosophical system. Almost all the systems hitherto proposed have rested upon some theory, which is now disallowed, and they have been attended with the usual inconvenience of all hasty and premature generalization—the inconvenience of associating dissimilar things, and separating those which are closely and naturally allied. Cullen's Nosology illustrates this inconvenience in almost every page. For purposes of public utility that nosological system is to be preferred which places most prominently before the public, as a distinct class, the diseases admitting of prevention or of mitigation by sound sanitary

measures. In this point of view, the classification adopted in the Reports of the Registrar-General is deserving of commendation.

96. There are some considerations connected with disease in general which are of far higher importance than the use of terms, or the adoption of a correct nomenclature and a scientific classification. These will be treated of under the following heads:—(*a*) Causes; (*b*) Symptoms and Signs; (*c*) Diagnosis; (*d*) Prognosis; and (*e*) Treatment.

97. (*a*) *Causes of Disease.* (Etiology.)—Many verbal distinctions are in use in respect of the causes of disease, but the division most generally recognised is, into *proximate* and *remote.*

Proximate Causes (Causæ abditæ, continentes, occult causes.)—This term has arisen out of the twofold meaning of the word disease. If a disease happen to be named from the part which it attacks, and the nature of the change that part is undergoing, as pericarditis, or inflammation of the pericardium, the proximate cause is the disease itself; if, on the other hand, the name is but the representative of a group of symptoms, as cough, dyspnœa, hectic fever, emaciation, &c.—the symptoms of phthisis—then the term proximate cause means the suppurating tubercle which gives rise to all these symptoms. But if we are ignorant of the seat of a disease, as is the case with fever, the search after a proximate cause is but an inquiry into the real nature of the disease.

Remote Causes. (Causæ evidentes.)—All constant antecedents of an event are called *causes* of that event, and all constant consequences of an event are called *effects* of that event. Hence the same thing may have many causes. Thus an hereditary taint, intemperance, or want, and a common cold, may exist in the same person as causes of pulmonary consumption. The hereditary taint may have rendered the person more liable than others to the formation of tubercles, intemperance or want may have occasioned their actual deposition, and the cold may have excited the dormant tubercle into activity. Now all these are *causes* of consumption, and the consumption may become the cause of death. How then are such causes to be distinguished from each other? They are divided into *predisposing* and *exciting.* In this instance, the *predisposing* causes are the hereditary taint, and the mode of life: the *exciting* cause is the cold, and the *proximate* cause (if the term must be used) the suppurating lung.

The condition of the body itself, however it may be brought about, is the *predisposing cause,* or the reverse, of any disease which may befall it; the *exciting causes* are external agents of various kinds, as cold, heat, &c. These external agents are also among the most powerful *predisposing* causes. Thus that combination of external influences which we call climate is the predisposing cause of a great variety of diseases, and any one of the elements of which it consists may become an exciting cause.

Some of the principal predisposing causes of disease have been already considered (§ 3—82) when speaking of temperaments, diatheses, hereditary predisposition, and idiosyncracies: of sex, age, occupation, and

mode of life: of residence and climate. Add to these the greater liability to any given disease arising out of previous attacks, and we have the leading predisposing causes of disease.

The exciting causes of disease are chiefly mechanical and chemical injuries, unwholesome food, undue exertion of mind or body, sudden and violent atmospheric changes, parasitic animals and plants, atmospheric poisons, poisons generated by the human body itself, and the poisons of venomous insects, reptiles, and mammalia.

98 (*b*) *Symptoms and Signs of Disease.* (Symptomatology, semeiotics.)—All lesions of structure, whether the consequence of external injury or of internal change, cause some disorder in the functions of the body, and almost every disorder of one function leads to derangement in those which are most closely connected with it. These disordered functions are called *symptoms*. Thus pain, cough, and difficulty of breathing are symptoms. Groups of symptoms, also, if they have a name, become compound symptoms. Thus fever is a symptom of inflammation.

99. The term symptom is variously qualified in medical writings. Thus we have *anamnestic* symptoms, or those which relate to a patient's previous state of health; *diagnostic*, or those which distinguish his disease from others; *prognostic*, or such as enable us to predict the event of his disease; *pathognomonic*, or those which are peculiar to his malady, and to that alone; *therapeutic*, or such as indicate the treatment to be adopted; *objective*, or such as can be seen or otherwise perceived by the physician himself; and *subjective*, or such as consist in sensations of the patient.

100. But we have also *signs* of disease, and the word *sign* has not precisely the same meaning as the word symptom, though the two terms are sometimes used without much discrimination. The difference between them will be best shown by an example. Cough, expectoration, dyspnœa, hectic fever, night-sweats, and emaciation are *symptoms* of pulmonary consumption, but they are not *signs*, for each of them may occur in other diseases; but cavernous respiration and pectoriloquy are signs. So also expectoration is not a *sign* of consumption but a symptom, for it occurs in many other diseases of the chest; but a certain kind of sputa is stated to be a *sign* of that disease. From this it would appear that *signs* are merely pathognomonic or diagnostic symptoms. There is, indeed, nearly the same difference between a symptom and a sign as between a character and a characteristic. Redness, pain, increased heat, and swelling are symptoms, or characters, or phenomena of inflammation; but redness and increased heat are at the same time symptoms and signs, characters and characteristics: pain and swelling are merely symptoms.

101. The term *physical* sign is in common use among medical men; it means a sign which is an object of sense. Thus, heat, redness, and swelling are physical signs of inflammation, pectoriloquy of phthisis,

coagulable urine of disease of the kidney. A physical sign is, therefore, synonymous with an *objective* symptom.

102. The first duty of the physician is the interpretation of symptoms: this he effects by careful examination. If, for instance, a patient complain of pain in the chest, he proceeds to ascertain whether that pain is external or internal, and if internal, what is its precise seat. If, again, a patient void urine different from that of health, he submits it to chemical tests, or he examines it under the microscope, that he may find out the exact nature of the change which it has undergone, and trace that change to its source. By thus weighing the value of every symptom, he learns what the disease is, what its severity, what the treatment to be adopted, what the hope of recovery. His success will greatly depend on the method of examination which he adopts. Some of the more important methods are described in chapter iv.

103. In the observation of disease, the physician should be prepared to encounter one great difficulty, viz., the variation of the same symptom in different cases, and the occasional absence even of those symptoms which when present are most characteristic. Thus, a frequent pulse is among the most striking symptoms of pulmonary consumption; but cases sometimes occur in which the pulse does not exceed its average number in health. In these cases, it is true, the number of beats may be really greater than it was in the same person in sound health, but by our ignorance of that number we lose the benefit of the symptom. This same symptom of increased frequency of pulse is among the most constant and characteristic attendants on fever, and yet in some epidemics the pulse has been unusually infrequent. These anomalies meet the physician at every turn.

104. (*c*) *Diagnosis*, or the discrimination of diseases, is the necessary prelude to the treatment of disease. It is the first duty which the physician has to perform at the bedside, and everything depends on the way in which he discharges it. A correct observation and just appreciation of symptoms are essential to a true diagnosis. Diagnosis, indeed, may be said to be the art of converting *symptoms* into *signs*.

105. The first impression which a patient makes on his physician is always an important element in the diagnosis: in most cases it enables him to form some idea of his patient's previous habits of life; to determine whether he is suffering from a slight or a severe illness, and, in many instances, to decide at once upon the nature of his complaint. Thus, anæmia, consumption, pneumonia, emphysema, Bright's disease, fever, and severe diseases of the heart, are often so strongly marked on the very countenance of the patient as to leave no doubt in the mind of the experienced physician; and many other diseases, such as palsy, chorea, gout, and rheumatic fever, several of the exanthemata, and skin diseases in general, betray themselves by single symptoms which are decisive of their nature. The diagnosis in such instances is very simple; but the task of the physician becomes

one of considerable difficulty when the disease is either imperfectly developed, as in the first stage of eruptive fevers, and in incipient phthisis, or when the only obvious symptom is one which may depend on several causes, as is the case with dropsy; and it is still more difficult when the nature of the complaint must be inferred chiefly from the description which the patient gives of his own sensations, or from a mere perception of the size and shape of a part of which the structure is concealed from view, as happens with the greater number of tumours. These are the cases which put the knowledge and skill of the physician to the test, and which sometimes baffle both.

106. In some instances it may be necessary to wait till the characteristic symptoms show themselves; in others, to make minute examinations by means of the stethoscope; in others, to apply chemical tests to the urine, or to call in the aid of the microscope; and in a few, to confess our ignorance. The effects of remedies, such as bloodletting and stimulants, will also in rare instances serve as a means of diagnosis. The symptoms which render us the greatest assistance in distinguishing one disease from another will be carefully examined in a future chapter.

107. (*d*) *Prognosis*. The meaning of this term is foreknowledge, and, as used by the physician, it means the anticipation of the course and event of diseases. The power of foretelling the progress and termination of a malady is of the first importance, not only as regards the treatment to be adopted, but as respects the comfort and well-being of the patient and his friends, and the reputation of the physician himself. A correct prognosis implies a just diagnosis, an accurate knowledge of the natural course and progress of disease, an appreciation of all the peculiarities, original and acquired, which distinguish one man from another (§ 3—82), and experience of the power and mode of operation of remedies. It must be obvious from this statement that the art of prognosis is one of unusual difficulty, and that it ought, for the sake both of the physician and his patient, to be exercised with discretion and caution.

108. This subject is too extensive to be fully treated in this place; but it may be well to point out and illustrate one or two of the leading questions which the physician may be called upon to solve. One of the most frequent questions is, whether the disease admits of cure? The answer is sometimes very easy. A case of hydrophobia, on the one hand, or of hysteria, on the other, presents no difficulty. The one is as certainly fatal as the other is curable. But in a case of tetanus, of pneumonia, or of pulmonary consumption, the prognosis offers greater difficulty. The first would be most probably fatal: the second is always attended with danger, the amount of which will chiefly depend upon the sex, age, temperament, and previous habits of the patient; the third is fatal in a very large majority of cases, and the probability of ultimate and complete recovery is very slight.

109. This latter disease—pulmonary consumption—offers a very

good example of the necessity of caution in forming and stating our prognosis. Pulmonary consumption is incurable, and medicine, at best, is but palliative; but if in every case of pulmonary consumption a physician were to foretel a fatal result, his reputation would suffer severely, for the simple reason that consumption, though ultimately fatal, in nine hundred and ninety-nine cases out of a thousand, is not necessarily fatal in any given attack, recoveries even from several successive attacks being by no means unusual; and this happens, not because the disease is curable, but because its fatality depends upon the amount of tubercular deposit, and the issue of any particular attack on the extent and activity of the suppurating process relatively to the power of the patient's constitution to bear the wear and tear consequent upon it. This is the true explanation of the asserted efficacy of medicines, regulated temperature, and change of climate in this disease.

110. This is the place to speak of that *vis medicatrix naturæ*—that power inherent in the human frame to right itself when suffering under severe disorders—which our predecessors were wont to acknowledge with such befitting modesty as their invaluable coadjutor in the treatment of disease; but which our own presumption leads us so often to overlook or undervalue. In thus withholding from nature the tribute which is her due, we are as unwise as we are unjust; for it is the obvious interest of the regular practitioner of the healing art to extol the powers of nature, and to attribute to them a large share of the success so commonly ascribed to his own treatment. It is only in this way that the public can be rescued from the grasp of empiricism. The homœopathist attributes to infinitesimal doses virtues which are simply ridiculous, and results which are utterly impossible; but the regular practitioner can explain the cures alleged to have been effected by this preposterous agency by means of that very *vis medicatrix* which so constantly stands him in stead in his own treatment of disease, and to which so much of his own success is attributable. It is this *vis medicatrix* which, having been long counteracted by the administration of active medicines, but restored to freedom by that expectant treatment which is the very essence of homœopathy, constitutes the real agent in the restoration to health under the hands of a race of quacks whose treatment in most cases is in itself harmless. There are other forms of quackery, and certain quack medicines, which are far from being harmless when carelessly administered, but which are of real service in certain instances. The public is informed of these successful cases; the unsuccessful or the fatal ones are, for obvious reasons, unknown. The frequent recovery of patients suffering from pulmonary consumption, either without treatment, or under the use of remedies which could not have exercised any great influence on the disease, goes far to complete the explanation of the success of quackery in the several forms and guises it assumes; while the alleged efficacy of change of climate in cases of pulmonary consumption is an apt illustration of the occasional identity of the mistakes made by the regular and irregular practitioners of medicine.

111. To what has just been said on the subject of the *vis medicatrix* it may be well to add that some of the greatest improvements in the art of healing have consisted in simple abstinence from injurious interference. Three centuries ago, for instance, it was the custom among surgeons to treat gun-shot wounds with boiling oil. But Ambrose Paré, by the happy accident of his supply of boiling oil falling short, was led to adopt that better plan of treatment which consisted in virtually leaving the sufferer in the hands of nature. At the same time, a contemporary of that great surgeon was boasting of his success in treating this class of wounds by a slimy mixture called the 'oil of whelps,' which had, in reality, the same effect of leaving nature to work her own cure in her own way.

112. If the foregoing observations be well founded, it must follow that to determine whether a patient's recovery from disease has happened in consequence of the treatment adopted, or independent of it, or in spite of it, is one of the most difficult trials to which a man's judgment can be subjected. The accomplished physician must often err in his decision; the ignorant empiric and the equally ignorant public are utterly unqualified to form an opinion concerning it.

113. (*e*) *Treatment.*—A correct diagnosis, a knowledge of the nature of the disease itself, of the constitution of the sufferer, and of the virtues of remedies, are essential preliminaries to judicious treatment. The object which the physician proposes to himself will vary with each case. In one case, it will suffice to remove the ascertained cause of indisposition; in another, it will be necessary to restore the altered function or diseased structure; in a third, we can merely hope to palliate the suffering which the disease occasions.

114. Our treatment will sometimes be founded on a correct knowledge of the nature of the disease and the mode of operation of our remedy, in which case we are said to pursue a *rational* treatment; in other instances, we act in ignorance of both, and then our treatment is said to be *empirical*. Again, our treatment may be *curative*, that is to say, it may restore the patient to perfect health; or *palliative*, in other words, adapted to the alleviation of suffering; or *preventive*, that is to say, directed to the preservation of health, or to obviate the recurrence of disease.

115. The abstraction of blood in inflammation is an example of *rational* treatment, for we understand both the condition of the part affected and the *modus operandi* of the remedy. The use of quinine or arsenic in ague is merely *empirical*, for we understand neither the nature of ague nor the mode in which these medicines affect the body in curing it. The treatment of pulmonary consumption is necessarily *palliative*, for, from the very nature of the complaint, it is obvious that it does not admit of cure. Such also is the case with a large proportion of neuralgic affections, and with malignant diseases.

116. In the treatment of many diseases we combine the rational with

the empirical, and the curative with the palliative. Thus, during an attack of remittent fever, we sometimes have recourse in turn to blood-letting to subdue local inflammation, to cold-sponging to diminish the heat of the surface, to stimulants to counteract existing debility, and to quinine to effect a cure of the disease.

117. Though the employment of remedies, the precise *modus operandi* of which we do not understand, constitutes what is usually designated as *empirical* treatment, the act of generalisation, by which we infer the utility of the same remedies in other analogous disorders, lends to our empiricism something of a rational character. For example, though the employment of quinine and arsenic in ague was originally pure empiricism, the use of those remedies, as the consequence of analogical reasoning, in the whole class of intermittent disorders, deserves to be characterised by a more complimentary epithet.

118. In treating disease we are necessarily guided by a close observation of the state of the patient and by his previous history. If, for instance, a patient presents a pallid appearance of the skin, gums, and tongue, we prescribe some preparation of iron; if, on the contrary, the complexion and colour of those parts is florid, we shall probably see reason to order depleting or lowering remedies. Now these opposite states of system are said to afford *indications* of treatment—grounds or reasons, that is to say, for giving preparations of iron in the one case, and resorting to depleting or lowering measures in the other. On the other hand, these same states of system constitute grounds for avoiding the opposite modes of treatment; in other words, they are *contraindications* of depletion and tonic treatment respectively. In like manner inflammatory symptoms *indicate* the necessity of depletion and *contraindicate* the use of stimulants.

119. The considerations brought forward in this chapter will serve to show the extreme difficulty which attends the practice of medicine, and the necessity imposed on the physician of supplying himself with very extensive and precise information on all the subjects which can conduce to a knowledge of the human body, on the one hand, or of the virtues of remedies, on the other. But, after all that can be done, the science of medicine must remain extremely imperfect, and the art extremely difficult. Our general principles, derived originally from particulars made up of many variable elements, must be reapplied in practice to individual instances as complicated as those out of which they were originally formed, so that precision is, in the nature of things, impossible, and certainty of very rare attainment.

120. Other considerations, which go far to explain the acknowledged difficulty of medicine, both as a subject of scientific inquiry and of practical application, are the variable severity of diseases bearing the same name, the changes which occur in the progress both of acute and chronic cases, and the variable strength of the remedies we administer. When we reflect that, prior to the setting in of any given disease, the constitution of the patient, originally marked by

peculiarities traceable to hereditary predisposition, has been subsequently modified by the powerful influences already examined; that the disease itself may vary within wide limits of intensity; that it passes naturally through many different phases; that it may fall under observation and treatment at any part of its course; that the remedies prescribed, being of variable strength, may be administered with more or less care and regularity, and the patient be tended with greater or less watchfulness and skill:—when we take all these circumstances into consideration, we cannot be surprised that medicine should be an imperfect and uncertain science, a conjectural and difficult art.

CHAPTER II.

CAUSES OF DEATH.

121. THOUGH a knowledge of the causes of death is of importance chiefly to those members of the medical profession who are engaged in the work of preventing disease, it is not without its interest for the practical physician. It supplies him, at least, with some definite idea of the relative frequency of the more severe and dangerous diseases, and of the demands which they severally make upon his attention.

122. The causes of death may be conveniently divided into three principal classes; of which the first comprises deaths by mechanical injuries, by scalds, burns, and corrosions, by the several forms of suffocation, by cold and want, by intemperance, and by poison; the second, deaths by debility in infancy and decay in age; and the third, deaths by disease properly so called.

123. In England the deaths are distributed through these three classes in the following proportions:—
Class I., 4 deaths; Class II., 16 deaths; Class III., 80 deaths.

124. The deaths in Class I. are so distributed that about half of the whole number are caused by mechanical injuries; about one-fourth by the several forms of suffocation (hanging, drowning, &c.); less than one-fifth by burns and scalds; one per cent. by cold and want; three per cent. by poison; and three per cent. by intemperance (exclusive of delirium tremens and other fatal diseases occasioned by excess).

125. The deaths in Class II. are nearly equally divided between deaths in early infancy by causes which interfere with complete development and adequate nutrition, and deaths from old age; the excess being somewhat on the side of the first of the two divisions.

126. The 80 deaths in every hundred which remain after subtracting Classes I. and II., and which are caused by diseases properly so called, admit of distribution into a few leading classes. In the first place, there is a very large and very important class of maladies, consisting of diseases propagated by contagion or infection, and destroying life by giving rise to severe local affections or by exhausting the vital powers. This class comprises small-pox, scarlet fever, measles, hooping-cough, typhus and puerperal fevers, and erysipelas. Again, there is a second class of diseases, which, like the foregoing, are due to external causes, but not to contagion, or, if to contagion, not to that cause exclusively; which are much more affected than the preceding

class by atmospheric changes, and, in common with them, attack numbers of persons in the same place at the same time—in other words, they prevail as epidemics. To this class belong ague and remittent fever, influenza, diarrhœa, dysentery and cholera, quinsy, and carbuncle. Another considerable class of diseases proves fatal chiefly to infants and young children. They have their source in some local irritation, such as teething, worms, or constipation, and lead to fatal affections of the brain and of the intestinal canal. This class comprises infantile fever, marasmus, and hydrocephalus. A larger class than any of the foregoing is made up of diseases which consist in a structural change or degeneracy of some texture or organ of the body. To this class belong scrofula, pulmonary consumption, and cancer. Diseases occasioned by some special impurity, or change of consistence, in the blood, constitute another class, of which rheumatic fever, scurvy, and gout are members. The remainder of the list of fatal maladies is made up of diseases of special organs or systems of organs, and of the accidents attendant on childbirth. Of the special organs or systems of organs, those of respiration (even exclusive of pulmonary consumption) occasion the greatest mortality; then those of the brain and nervous system; then those of the organs of digestion; then those of the heart and circulation.

127. The 80 deaths from disease remaining after the subtraction from the whole 100 deaths of those due to the causes specified in § 123, are made up in the following manner:—

Diseases due to Structural Degeneration (including Pulmonary Consumption)	16
Diseases of the Organs of Respiration (exclusive of Pulmonary Consumption)	15
Contagious Diseases	14
Diseases of Infancy and Childhood	9
Diseases of the Brain and Nervous System	7
Epidemic Diseases not being Contagious	6
Diseases of the Organs of Digestion and Assimilation	6
Diseases of the Organs of Circulation	4
Diseases due to changes in the Blood	1
Diseases of the Urinary Organs	1
Childbirth, &c.	1

128. If, instead of classifying fatal diseases chiefly in accordance with their natural and presumed causes, we distribute such of them as have their seat in the more important organs or systems of organs in accordance with the parts affected, we should obtain, for 1000 deaths, the following results:—

Organs of Respiration	320
Brain and Nervous System	144
Organs of Digestion and Assimilation	104
Carry forward	568

Brought forward	568
Heart and Organs of Circulation	35
Urinary Organs	10
Childbirth and Organs of Generation in the Female	10
Joints and Organs of Locomotion	9
Skin and Integumentary System	6
Total	638
All other Causes	362
	1000

129. If from diseases of organs and systems of organs we pass to single diseases, we find the mortality from the more important diseases in England, in 1000 deaths, somewhat as follows:—

Pulmonary Consumption	125
Bronchitis and Asthma	78
Pneumonia	62
Convulsions	59
Scarlatina	41
Typhus Fever	38
Diarrhœa, Dysentery, and Cholera	36
Hooping-Cough	24
Paralysis and Apoplexy, each	21
Hydrocephalus and Measles, each	18
Cancer	14
Tabes Mesenterica	11
Croup and Teething, each	10
Influenza, Inflammation of the Brain, and Inflammation of the Bowels, each	8
Scrofula	7
Small-Pox	6
Erysipelas, Epilepsy, and Rheumatism, each	5
Ileus, Intussusception, and Stricture of Intestinal Canal	4
Inflammation of the Liver, Inflammation of the Peritoneum, Jaundice, Ileus, Inflammation of the Larynx, Pleurisy, and Thrush, each	3
Syphilis, Ulcer of the Intestines, Hernia, Ascites, Inflammation of the Stomach, and Bright's disease, each	2
Inflammation of the Pericardium, Remittent Fever, Delirium Tremens, Insanity, Diabetes, and Infantile Fever, each	1
Quinsy, Purpura, Aneurism, Cyanosis, Gout, Intemperance, Inflammation of the Bladder, Carbuncle, Inflammation of the Kidney, Stone, Stricture of the Urethra, Ovarian Dropsy, Noma, Tetanus, Ague, Ischuria, Fistula, and Chorea, each less than	1

The mortality from some of the last-named diseases is very small. It is only 164 in the million deaths from chorea; and only 33 in the million from hydrophobia.

130. A chapter on the Causes of Death would be incomplete if some notice were not taken of what are sometimes called the *proximate causes* of death, or 'modes of dying.'

Death is said to have happened when the heart has ceased to beat. Hence, in considering the proximate causes of death, or modes of dying, we are inquiring by what means the pulsation of the heart may be made to stop. The first and most direct mode is by acting on the muscular structure of the heart itself, which may be either paralysed by a nervous shock, or weakened by chronic structural disease. The second mode is by withdrawing, suddenly or slowly, the blood which should act as its stimulus to contraction. The third mode is by cutting off, more or less suddenly, the supply of arterial blood to the left side of the heart by an impediment offered to the breathing. These three causes of death or modes of dying may be conveniently examined under the three heads and distinct designations of death by *asthenia*, death by *syncope*, and death by *apnœa*.

131. (1.) Death by *asthenia*. The beat of the heart, in a perfectly healthy person, may be suddenly arrested by several causes acting with great force on the nervous system. The lightning-stroke is one of them, strong mental emotion another, a violent blow on the head a third, a similar blow on the pit of the stomach or the shock of cold drinks a fourth. One or two of the more active poisons, such as prussic acid, or oxalic acid, or strong alcohol, in full doses, destroy life in the same way. The poison of the *upas antiar* introduced directly into the circulation has the same immediate effect; and the same may be said of air introduced into the right side of the heart. The sudden effusion of even a small quantity of blood on the surface or into the substance of the brain may also occasion this sudden arrest of the heart's action. The chronic structural diseases of the heart which are capable of bringing about this same mode of death are either fatty degeneration, which impairs and weakens the muscular tissue itself, or ossification of the arteries, which interferes with the due supply of arterial blood to the walls of the heart. Either of these conditions may so impair the power of the heart that any of the causes just enumerated, acting with comparatively slight force, may suffice to bring about a sudden and fatal pause in the action of the heart.

As in this mode of death the circulation of the blood may be said to be simply arrested, and not deranged, the right and left cavities of the heart are found full, the one of venous, the other of arterial, blood.

132. (2.) *Death by Syncope.*—The most obvious cause of death by syncope is the sudden pouring out of a large quantity of blood in consequence of the wound or rupture of some large vessel; but the body may be more slowly drained of the vital fluid by hæmorrhage and by exhausting discharges of long *continuance*; so that at length the

quantity of blood may be reduced so low, and its quality be so impaired that the stimulus afforded to the heart is insufficient, and it ceases to act. In either case all the cavities of the heart will be found after death either quite empty or containing but a small quantity of blood. Extensive ruptures and wounds of the heart destroy life partly by syncope and partly by disabling the organ, so that its propulsive power is either impaired or lost.

133. (3.) *Death by Apnœa.*—This form of death is much more common than either of the foregoing. By far the majority of persons die suffocated; a few by what may be termed acute suffocation; a much larger number by that general failure of respiration which attends the exhaustion of the strength brought about by all severe diseases. Acute suffocation may be occasioned by several causes:—by constriction of the throat, as in hanging and strangulation; by closing of the mouth and nostrils; by strong pressure on the chest; by exclusion of the air, as in drowning; by the substitution of a gas not containing oxygen for atmospheric air; by spasm of the glottis; by inflammation and swelling of the upper part of the larynx, caused either by hot water or corrosive poisons, or by disease; and by small foreign bodies wedged between the walls of the rima glottidis. Acute suffocation is of comparatively rare occurrence in disease. It will suffice to state in general terms, that it may arise from causes affecting the larynx, or trachea, such as laryngitis and croup, or from causes affecting the more minute branches of the air-tubes and the air-cells, as in rapid collection of blood, or of mucus, in lungs previously diseased. Acute suffocation might also arise from the admission of air into the pleura of one lung, the other being so diseased as to be unable to supply the wants of the system; and the same result would follow from large effusions of blood or of serum rapidly poured out into the sac of the pleura.

134. But, as it has been already stated, by far the majority of deaths from apnœa are due to that gradual failure of the respiration which attends the exhaustion of the strength brought about by all severe diseases. In other words, the greater number of persons die suffocated by the combined failure of the nervous influence which rules the action of the muscles of respiration, and of the power of the muscles themselves, together with the pouring out of mucus into the air-passages, and exudation of serum as the result of the extreme debility of the capillary vessels. Hence the quick breathing and loud mucous râle (death rattles) which combine to give warning of the near approach of death in the vast majority of patients.

135. In this brief account of the direct causes or modes of death no allusion has been made to that cause of death which has been described as "death beginning at the head;" for death so beginning at the head, or in the brain, is directly and immediately due, in one class of cases, to *asthenia*, in another class to *apnœa*. Death is due to asthenia in all those cases in which the injury to the brain is so great and sudden that

in reacting upon the healthy heart it brings it directly and speedily to a stop, as well as in those cases in which the injury being less considerable, reacts upon a heart previously weakened by disease. Death, on the other hand, is due to *apnœa* when the injury to the brain not being sudden or intense in degree, reacts upon a healthy heart. This is the mode of death in the majority of cases of apoplexy, in which the fatal termination is ushered in by progressively increasing difficulty of breathing, and the death rattles.

CHAPTER III.

PHYSIOLOGY AND GENERAL PATHOLOGY.

136. THE human body may be considered as a machine, not less remarkable for the finished workmanship of its parts, and the consummate skill with which they are put together, than for its complexity. In these respects it resembles, at the same time that it infinitely surpasses, the most perfect work of men's hands: but it stands alone in this, that it contains within itself the means of ministering to its own growth and preservation, and, within certain limits, of repairing the many injuries to which it is exposed.

137. A framework for locomotion and for the protection of its more important organs; a nervous system with the brain and spinal marrow as its centre of sensation, volition, and thought; a digestive apparatus for the assimilation of its food; organs of circulation for distributing throughout the body the nutritious liquid blended with the pre-existing blood; viscera for the secretion of the several fluids needed by the economy, and for the constant purification of the blood as constantly undergoing contamination from the decomposition of the effete textures of the frame; and a nervous network bringing the important internal organs of the economy into effective and harmonious action—such are the chief constituent parts of this machine.

138. The intimate connection which exists between the several parts of the frame, and the close dependence of one function upon another, are even more remarkable than the multiplicity of the parts themselves, and the variety of functions which they perform. If the heart ceased to circulate blood, or the lungs to purify it, the nervous system would no longer send forth those influences by which the heart beats, and the chest breathes. If, on the other hand, the nervous centres suffer severe injury, respiration is impeded or prevented, and the heart soon ceases to beat. External influences also, on whatever part of the frame they act, affect not that part only, but through it other organs, and through these the entire body. Again, the mind affects the body, and the body reacts upon the mind, and both together form a being so intricate in structure, and so complex in function, that the continuance of its life and the maintenance of its health appear a constant miracle. But the perfection of this machine is equal to its intricacy; and thus it happens, that while the one provides under favourable circumstances for the free play of all its parts, the other exposes it under unfavourable ones to serious derangements of function and alterations of structure.

139. The brief outline just given of the constituent parts of the human frame will serve to indicate the contents of the present chapter, which are as follows:—

i. The physiology and general pathology of the fluids, including digestion, chylification, sanguification, and excretion.

ii. The physiology and general pathology of the circulating organs, considered as instruments for the distribution of the blood.

iii. Structural physiology and pathology.

iv. The physiology and general pathology of the nervous system.

v. Mental physiology and pathology.

I. PHYSIOLOGY AND GENERAL PATHOLOGY OF THE FLUIDS.

140. The functions of digestion and assimilation, or the conversion of the food successively into chyme and chyle: the composition and leading properties of the blood and its constituent parts; and the functions of the lungs, skin, kidneys, and liver, with the nature and composition of their secretions, are the subjects which fall to be considered under this head.

141. *Digestion.*—It is now generally understood and admitted that waste of material is a condition of vital action; so that the slightest movement of the body, the most evanescent thought, the most transient exertion of the will, is accompanied by a loss of substance; which loss of substance is due to the death of certain particles of the organ concerned in the vital action. The consequence of this *death* of the minute constituent parts of the frame is that they fall under the control of chemical laws, are resolved into compounds unfitted to support life, and must be removed from the body by one or other of the excreting organs. The sum of the daily waste of the several parts of the body, therefore, is determined by the sum of its daily actions and exertions mental and bodily; and this waste must be supplied by food.

142. In an adult arrived at his full growth, in perfect health and vigour, and using no undue exertion of mind or body, the daily waste is repaired by the daily food, and the weight of the body undergoes little or no change from day to day. But there are many ways in which this nice balance of waste and supply may be destroyed. It may be destroyed by increased exertion without a proportionate increase of food; or by a still greater amount of exertion, the appetite remaining good, and the supply of food unlimited; or by increased exertion with diminished supply of food, as in training for the turf; or, lastly, with great rapidity, by entire abstinence from food, as in shipwreck and famine. In all these cases the weight of the body is diminished. On the other hand, in healthy persons, with unimpaired digestion, the body gains weight either by inactivity, or, within certain limits, by increase in the quantity of food.

143. In certain diseases, again, waste goes on with extreme rapidity: as in fever, when rapid destruction of the textures is combined with a

complete loss of the appetite for food; in pulmonary consumption, when, the appetite remaining, as it often will, unimpaired, the local waste, added to profuse sweats or discharges from the bowels, exceeds the powers of assimilation; in tabes mesenterica, in which the diseased glands refuse to transmit the chyle; in diabetes, where the mal-assimilation of the food renders the repair of even a moderate loss of substance impossible; during exhausting discharges, which drain the body of its blood; and in some local diseases or injuries, attended by rapid loss of substance in the part affected—a loss which the most nourishing diet is unequal to repair.

144. During the period of growth, food is required not merely to supply the waste due to the destruction of parts, but to furnish new material. Hence the large consumption of food in childhood and youth in proportion to the dimensions of the frame.

145. One use of food, therefore, is to supply the waste of substance constantly going on; but this is not the only service rendered by the food we eat. A considerable portion of it would appear to be employed in the production of animal heat. The quantity and quality of our food, therefore, are determined by its use as a repairer of waste, and as a means of supporting the temperature of the body. For the first purpose, the food must contain those elements which abound in the structure of the body itself; for the last, a large supply of carbon is especially requisite.

146. There is still one other form of waste which it may be well to specify—a waste of water. During strong exertion, and under exposure to a high temperature, but especially when the two are combined, water is profusely discharged from the lungs and skin. There are also certain diseases accompanied by a large and rapid outpouring of fluid, of which the most remarkable are Asiatic cholera and diabetes. In the first of these, the fluid is thrown out from the mucous membrane of the alimentary canal; in the last by the secreting apparatus of the kidney.

147. The sensations of *hunger* and *thirst* are the appointed means by which we are warned of this twofold waste of the solids and fluids of the body, and by which we are invited to repair it.

148. In healthy persons leading temperate lives the intensity of these sensations bears a just relation to the wants of the frame; but there are some diseases in which the indications they afford are fallacious, and there are modes of life which tend to blunt them, or to render them unduly acute.

149. A sensation of hunger altogether disproportioned to the true wants of the frame is not of uncommon occurrence. It is present in certain nervous and mental disorders, and in many persons who lead an indolent and inactive life; and in rare cases, which bear a close resemblance to spectral illusions and other violent excitements of the organs of sense, it reaches that point of intensity which is characterised

as *Bulimia*. The appetite, again, may be unduly stimulated by condiments, and by the arts of a refined cookery. On the other hand, the appetite may be impaired or destroyed by the use of opium, tobacco, and spirituous liquors in excess, by sudden emotion, and by intense mental application. It is also impaired or destroyed in the majority of diseases, especially in inflammatory and febrile disorders.

150. Again, the sensation of hunger, though under ordinary circumstances a measure of the wants of the frame, sometimes deceives us as to its power of making a profitable use of the food supplied to it. In the early stages of tabes mesenterica, for instance, the body wastes in consequence of the obstruction offered to the passage of the chyle into the blood: but the stomach remaining sound the appetite bears a due relation to the wants of the frame, and is often voracious. It is not till the more advanced stage of the disease, when hectic fever sets in, that the appetite fails and the digestion becomes impaired.

151. The same observations hold good in respect of thirst. There are many ways in which it may become disproportioned to the wants of the frame; such as a hot and stimulating diet, salt meats, and wine or spirituous liquors in excess. Intense thirst also characterises the operation of the irritant poisons. But this symptom is to be regarded partly as a false sensation due to active inflammation in the back part of the throat and fauces, to which parts the sensation of thirst is referred, and partly as an indication of the pressing necessity for the dilution of the poisoned blood. There is also a diseased condition, the analogue of bulimia, known as *Polydipsia*.

152. As in a healthy and natural state of the body the appetite serves as an index of the amount of food required to repair the waste of the frame, and to support the process of combustion going on in the lungs, so, in certain diseased conditions, does the utter failure of the appetite serve to point out the expediency of a total abstinence from food. This is especially the case during fever and inflammation, when, all the secretions being suppressed, the gastric juice is no longer formed, digestion is rendered impossible, and indifference to food is heightened into a positive loathing, or *nausea*.

153. But though the sensations of hunger and thirst, in a healthy person, and under ordinary circumstances, may be regarded as accurate indications of the wants of the frame in respect of solid and liquid food, these indications are not so exact as to supersede the influence of habit. On the contrary, experience proves that a considerable latitude in the quantity of food taken and in the number of our meals is perfectly compatible with sound health. Nature does not prescribe in a manner not to be mistaken either the quantity or the time.

154. Nor is the quality of the food best adapted to the wants of our frames indicated with such precision as to preclude the use of a diet varying greatly in different climates and among different races of

men; for though the formation of the teeth is held to prove that man was destined to partake both of animal and vegetable food, experience proves that a diet consisting exclusively, or almost exclusively, of the one or the other is consistent with perfect health and great strength.

155. There is one period of life, however, at which the diet best suited to the wants of the frame is indicated in a manner not to be misunderstood, both by the absence of the means of mastication and by the supply of the food itself; namely, the period of infancy. The substitution at this period of a diet differing materially from that supplied by nature is often attended by fatal results. To this cause, in fact, though not exclusively, may be attributed the high mortality of the inmates of foundling hospitals during the first year of life, and of the children of the working class in infancy and early childhood.

156. The first step in the process of digestion is chiefly mechanical. It consists in the division and trituration of the solid portions of food by the teeth, the moistening of them by the saliva, and their propulsion into the stomach. The conditions essential to the perfect performance of this first part of the process of digestion are, therefore, the soundness of the teeth, the careful performance of mastication, and the secretion of a sufficient quantity of saliva. Of these, that which is under the control of the will—mastication, is often very insufficiently performed, either from habit, or from preoccupation of the mind by study or business. This is one cause of indigestion.

157. The food masticated by the teeth and moistened by the saliva, being received into the stomach in successive morsels, causes the muscular coat to contract, and stimulates the vessels of the stomach to the secretion of the gastric juice. As each morsel of food arrives in the stomach, the organ contracts so as to blend it with the food already received, and relaxes again, after an interval of a few seconds, to receive the next morsel. When the meal is finished, a periodic peristaltic action of the transverse fibres sets in, commencing at the cardiac orifice, and extending through the entire organ, with greatly increased force and rapidity in the part nearest the pylorus. This peristaltic action, which continues at short intervals till the digestion of the meal is complete, causes a circulation of the food in two currents, the one revolving externally from the cardiac orifice towards the pylorus, the other returning internally from the pylorus along the axis of the organ. In this way the several portions of the food become mixed, and exposed equally to the action of the gastric juice. During the intervals of contraction the pylorus relaxes slightly, so as to allow a small portion of chyme to pass into the duodenum.

158. The gastric juice, secreted under the stimulus of the food, is a clear, transparent fluid, without odour, slightly salt and perceptibly acid, the acidity being probably due to free lactic acid. It also contains a peculiar principle called *pepsin*.

159. The gastric juice has the property of promptly disintegrating

and dissolving food, and of checking putrefaction. It is poured out with great rapidity, in quantity proportioned to the food to be digested; but if the amount of food taken exceeds the wants of the frame and the indications of the healthy appetite, part of it remains undigested, and by undergoing decomposition generates carbonic acid and other gases.

160. When the food is of a solid or pulpy consistence, the gastric juice acts upon it almost immediately; but when liquids are taken in excess with the food, they are removed by absorption before the process of digestion can take place. This fact has an important practical bearing.

161. The time required for the digestion of the food varies in different persons, and in the same person at different times and under different circumstances. The chief causes which affect the duration of the process, irrespective of the state of the body and of the stomach and its secretions, are, the quantity, quality, and degree of division of the food itself, the quantity of the saliva, and the quantity of the liquid with which it is mixed.

162. The states of body and mind most favourable to digestion are, repose and cheerfulness: strong exercise of the body and anxiety or preoccupation of the mind impair the power of the stomach. Too short or too long intervals between meals are also injurious; the one by overtasking, the other by wearying, the organ. Strong alcoholic liquors in excess are eminently injurious; but when judiciously administered in small quantity, they act as condiments in promoting digestion.

163. The gastric juice acts out of the body almost as well as in the stomach, provided it be kept at the temperature of the organ and in motion. When the temperature is much lowered, its power is greatly impaired, and when raised to 115° or 120° Fahr. it is destroyed and cannot be restored. An artificial digestive fluid may be made by soaking the fresh mucous membrane of the stomach of an animal in dilute muriatic or acetic acid. At a temperature of from 99° to 100° it converts food into a substance closely resembling chyme.

164. Some important information respecting the function of digestion, and the properties of different kinds of food, has been obtained by Dr. Beaumont, M. Londe, and others, who have had opportunities of narrowly observing persons afflicted with fistulous openings communicating with the stomach or small intestines. The more important conclusions arrived at by these observers, may be briefly stated as follows:—1. Animal food is more completely digested than vegetable food, but is retained longer. It appeases hunger more completely, and is more stimulating. 2. Vegetable food leaves the stomach with its texture only partially destroyed and very perceptible. When the wants of the system are not urgent, the digestion of those vegetable substances which are most difficult of assimilation does not begin till they arrive at the ileum, though fully exposed to the action of the

gastric, biliary, and pancreatic fluids. When, however, the wants of the system are urgent, the digestion of these substances takes place much more promptly. 3. When animal and vegetable food are taken together the vegetable portion leaves the stomach first. 4. The more cohesive the food the longer does it remain in the stomach, and *vice versâ*. 5. The more nutritive the food the longer does it continue in the stomach. 6. Fatty and oily substances are most difficult of digestion. 7. As a general rule, boiled meats are more easy of digestion than roasted, and roasted than broiled.

165. The leading constituents of the food are differently acted upon by the gastric juice. Woody fibre, husks of fruit and grain, horn, hair, &c., are not at all digestible; albumen is dissolved and so changed in composition that it is no longer coagulated by heat; fibrin and coagulated casein are dissolved and partially converted into albumen; gluten loses its property of gelatinizing; sugar of milk becomes converted into lactic acid, and starch into sugar. Fat and oil pass out of the stomach unchanged, and are reserved for the action of the pancreatic juice.

166. The action of the gastric juice upon the food results in a substance known as *chyme*—a substance by no means uniform in colour, consistence, or composition, but varying in all these respects with every change of diet.

167. Several attempts have been made to simplify our views of digestion, and of the multitudinous ingredients of which our food consists, by reducing the constituents of that food to two or three leading elements or classes of elementary principles. Dr. Prout resolved all food, whether animal or vegetable, into four classes or groups of staminal principles—the *aqueous* (water), the *saccharine* (sugar, vinegar, starch, gum, &c.), the *albuminous* (the proximate principles of animals, and vegetable gluten), and the *oleaginous* (oils and fats). Neither of these principles taken alone will support life; and no substance which constitutes the food of the more perfect animals consists of less than three, if not of four of them. Milk, the nourishment provided by nature for the young of animals, is a compound of all these principles.

168. A more simple classification consists in dividing the several organic constituents or elements into the *nitrogenous* and the *non-nitrogenous;* the first class comprising the protein compounds, albumen, fibrin, casein, gelatin, &c.; the second, animal sugars and fats, lactic and acetic acid, &c.

169. The discovery of *Protein*, of which albumen, fibrin, and casein are merely modifications, and the further discovery that these three substances, so nearly identical in composition and properties, are constituents both of animal and vegetable matters, has tended still further to simplify our views of the process of nutrition.

170. *Protein* (from the Greek verb πρωτεύω, to be first) may be

obtained from albumen, fibrin, or casein, by dissolving them in a moderately-strong solution of caustic potash, and exposing the solution for some time to a high temperature. On the addition of acetic acid the protein is precipitated as a gelatinous translucent matter. The ultimate analysis of this substance yields about 56 parts of carbon, 22 of oxygen, 16 of nitrogen, and 7 of hydrogen, in 100 parts.

Ten parts of protein, with one of phosphorus and two of sulphur, constitute albumen, as found in the serum of the blood; ten parts of protein, with one of phosphorus and one of sulphur, constitute fibrin; and ten parts of protein, with one of sulphur, constitute casein.

The other proximate organic principles, gelatin, chondrin, elain, stearine, margarine, hæmatosine, globulin, &c., also consist of the four gaseous elements (nitrogen, carbon, oxygen, and hydrogen), in different proportions, with or without phosphorus and sulphur.

171. For practical purposes, Dr. Prout's views on the function of digestion may be advantageously adopted. He represents the food as undergoing two changes in the stomach, *reduction* and *conversion*. The one consists in the formation of a homogeneous pulp; the other is a chemical action, by which the several staminal principles are converted into substances similar to those that enter into the formation of the blood.

172. Each of these processes is liable to be deranged. The *reducing* power of the stomach may be increased, while the *converting* power is diminished. In these cases large quantities of food are taken, but the products of digestion pass off by the bowels, or, in rare instances, entering the blood, are discharged unchanged by the urine. On the other hand, the reducing power of the stomach may be diminished, giving rise to various forms of dyspepsia. If the converting power at the same time remain intact, the patient may gain flesh; if it be diminished, he grows thin. The reducing functions of the stomach may be impaired by over-repletion, by the excessive use of liquids, especially those of a stimulating kind, by injudiciously-prolonged abstinence, or by the abuse of condiments.

173. The *converting* power of the stomach may be unusually active, in which case the food is rapidly converted into nourishment; or it may be lost in respect of all the principles, in which case the body ceases to be nourished; or it may extend to one only of those principles, and thus lay the foundation for serious disease.

174. The mal-assimilation of the saccharine principles (sugar and vinegar, starch, lignin, and gum) causes the formation of sugar, which finds its way into the blood and urine in diabetes; of oxalic acid, which, in union with lime, constitutes the oxalate of lime, or mulberry calculus; and of lactic acid, which abounds in rheumatic and hectic fevers, and is probably the chief ingredient in the acid liquors discharged from the stomach in dyspepsia. Mal-assimilation of the albuminous principles (albumen, gelatin, fibrin, and gluten) may lead to an excess of albumen, conveyed into the blood and eliminated by the

kidneys, and to the formation of lithic acid and cystic oxide calculi: the mal-assimilation of the allied gelatinous principles leads to an excess or deficiency of urea, or of its equivalent, the carbonate of ammonia. The mal-assimilation of the oleaginous principle, in consequence of functional or structural disease of the pancreas, leads to a deficiency of fat in the frame, or leanness; an unusual power of assimilating this principle, to corpulence.

175. These forms of mal-assimilation are inferred to exist, not so much from the analysis of substances rejected from the stomach, or contained in it after death (though sugar has been found in the stomach in excess in cases of diabetes), as from discovering the products of such mal-assimilation in the blood and urine.

176. The want of power to assimilate one or other of the staminal principles may often be traced to hereditary predisposition, and to those causes which impair the general power of the stomach, liver, and pancreas.

177. The chyme having passed from the stomach into the duodenum is mixed with the bile and with the secretion of the pancreas. By the latter of these secretions, any oily or fatty matters which the chyme may contain are dissolved.

178. The part which the bile plays in the completion of the digestive process is not so well ascertained. One of its offices would appear to be that of neutralizing, by means of its alkaline constituents, a portion of the free acid of the chyme. It also acts as a stimulus to the mucous membrane of the intestinal canal, promoting both the secretion of mucus and the natural action of the bowels.

179. The bile also subserves the function of respiration, through its principal constituent the *bilin*, or *choleic acid*, a substance rich in carbon and hydrogen, and having a strong affinity for oxygen. The sugar which has been proved to exist in the blood of the hepatic vein is also, from the large proportion of carbon it contains, admirably adapted to subserve the process of respiration. The liver has, moreover, the power of separating fatty matters from the blood.

180. The highly-carbonised substances which the bile contains, in the passage of the bile through the intestines, are absorbed by the lacteals and poured into the stream of blood; a small part only of the bile, estimated at one thirty-fourth part of the entire secretion, being rejected from the body in the fæces; while the highly-carbonised saccharine matters found in the hepatic vein pass on at once into the ascending cava, enter the heart, and are circulated through the lungs.

181. The function of the fœtal liver is doubtless analogous to that of the adult liver. The bile is secreted, and probably poured into the intestines, as in the adult: that portion of it which is fitted to form a part of the circulating fluid is absorbed and carried into the venous system; while that portion which in extra-uterine life mixes with the

undigested portions of the food and other effete matters, and is discharged from the bowels at short intervals, as fæces, accumulates in the intestines as meconium, and is expelled during delivery, or soon after birth.

182. The biliary secretion stands alone in being formed from blood that has already served other purposes in the economy—the blood of the vena portæ. As this vein derives its supply mainly from the intestinal canal, it suffers distension whenever the coats of the intestines are unusually loaded with blood. Hence the secretion of the bile depends upon the supply of blood from the intestines, and, on the other hand, the vascular system of the intestines, and the functions of the intestinal canal, are influenced by the quantity and quality of the biliary secretion.

183. That the principal function of the liver is one subservient to the process of respiration is highly probable from its position in relation to the lungs. Considered as a part of the circulation, the portal vein consists of a venous trunk formed by the union of nearly the entire venous system of the alimentary canal. Of the blood which this venous trunk conveys to the liver part is used in secreting bile, which finds its way back into the intestinal canal, and part passes on to the heart. If we suppose for a moment that in place of a duct conveying bile into the duodenum, we had a vein opening into that viscus, and constituting a branch of the portal vein, we should have the most efficient of safety valves to guard against the engorgement of the lungs with blood. Discharges of blood, there is reason to believe, do actually occur from the biliary duct in extreme cases of congestion of the liver, whether connected with a similar state of the lungs or independent of it. But it is obvious that an abundant secretion of bile, discharged into the duodenum and regurgitating into the stomach, or carried forward through the intestines, would answer the same end. This is the probable explanation of certain cases of bilious vomiting and diarrhœa, and of the excessive evacuations of bile which occur in phthisis pulmonalis and in diseases of the lungs, functional and organic. In cold climates, a sedentary life, giving little play to the lungs, conjoined with indulgence in the pleasures of the table, leads to an increased secretion of bile, part of which passing into the intestines, doubtless tends to prevent congestion of the lungs, and part being absorbed into the blood tinges the conjunctiva, and, in extreme cases, the skin. Strong exercise in the open air, by calling the lungs into activity, and promoting a more thorough combustion of the carbon and hydrogen of the blood, lessens the necessity for the formation of bile, rapidly removes symptoms of indigestion, and restores the natural clearness of the complexion. In hot climates again, the demand upon the lungs for the combustion of the carbon and hydrogen of the blood being diminished, if more nourishment is taken than is required, bile is formed in increased quantity. In either case (whether in cold or hot climates), habitual excess in eating and drinking leads to the same result—functional or organic disease of the liver. Another acknow-

ledged cause of liver disease is the abuse of the liquid hydro-carbons—the several forms of spirituous liquor.

184. The intermediate position of the liver—between the lungs on the one side, through the right cavities of the heart, and the intestines on the other, through the vena portæ—accounts for the frequency of functional and organic diseases of the liver, as indirect consequences of disorders of the lungs on the one hand, and of disorders of the intestinal canal on the other.

185. The discovery of the true use of the pancreas has thrown light upon a subject upon which little was previously known—mal-assimilation in the duodenum. The absence of the pancreatic secretion would be accompanied by a loss of the power of dissolving or reducing fatty and oily substances, which would accordingly pass from the bowels unchanged. Fatty stools would, therefore, indicate disease of the pancreas, either putting a stop to its secretion, or preventing the flow of the pancreatic fluid into the bowels. The secretion of the pancreas also possesses the property of converting starch into sugar.

186. The excrementitious matter, mixed with a small portion of the bile, passes through the intestinal canal, and is discharged as *fæces*. The bile and the indigestible portions of the food form the natural stimulus to the motions of the intestinal canal; an excess of bile increases the peristaltic action, a deficiency of it, as in diminished secretion or obstructed flow of bile, causes constipation. In like manner, an excess of excrementitious, and especially of ill-digested matters, produces diarrhœa; and the absence of all indigestible matter from the food tends to cause constipation. This is one of the evils of an over-refined cookery. The passage of the fæces through the intestines is also greatly promoted by the movements of respiration, and by all exercises by which the abdominal muscles are called into play. Hence the effect of sedentary habits in producing constipation.

187. The fæces form but a small proportion of the entire egesta; for, in Dr. Dalton's experiments, ninety-one ounces of ingesta yielded only five ounces, or about 1-18th part, of fæces. The quantity of this excretion, however, varies greatly in different persons, and in the same person at different times, and has also a close dependence on the quantity of indigestible matter taken with the food.

188. Of the two portions into which the chyme is separated, viz., chyle and excrementitious matter, the chyle is absorbed by the lacteals, and conveyed into the thoracic duct, where it is mingled with the lymph collected from every part of the body by the absorbents. This mixed fluid, after having undergone changes in its course through the lacteals by which the quantity of albumen is greatly increased, is poured into the left subclavian vein, and becomes a part of the blood. The absence of these changes is supposed to be one cause of disease, leading in children to obstruction of the mesenteric glands, and, at more advanced periods of life, to the deposit of an imperfect

albumen, mixed with fatty or earthy matters, constituting scrofulous matter, tubercle, and gouty concretions.

189. To the changes which the food undergoes from its reception into the stomach till it is mingled, in the form of chyle, with the blood, Dr. Prout gave the name of *primary assimilation*. The changes which take place in the capillaries during the formation of new parts, the conversion of the effete structures of the body into lymph, and those which the lymph itself is presumed to undergo in its passage through the absorbent system, he called *secondary assimilation*. A few words in reference to this latter process will complete this outline of the means by which the constant waste of the circulating fluid in secretion and nutrition is repaired.

190. The precise nature of the changes that take place in these minute parts cannot be determined by direct observation, but must be inferred from the composition of the blood, on the one hand, and the composition of the various excretions, on the other. In the formation of the several secretions and structures of the body, many ingredients of the blood, such as fibrin, albumen, salts, &c., must be removed, and the blood itself must be returned to the heart robbed of a portion of its chief constituents. In the destruction of the effete and useless parts of the frame, on the other hand, many new principles are formed, which are destined for removal by the excreting organs, and which, if not so removed, act as poisons, and give rise to serious diseases. But the blood may be tainted, not merely by the accumulation of these matters in it, but by the formation of others still more injurious, in consequence of *secondary mal-assimilation*.

191. The principal structures of the body are the albuminous and the gelatinous. The *albuminous* structures which in health are resolved into lithate of ammonia, when mal-assimilated give rise to lithic acid gravel, and perhaps to certain combinations of cyanogen that act as subtle poisons. During this imperfect assimilation, certain diseases of the albuminous tissues are supposed to arise.

192. The *gelatinous* tissues which in health are resolved into lactate of urea, when mal-assimilated, are converted into sugar and urea, or into oxalic acid and urea, the urea being replaced in either case by carbonate of ammonia. The mal-assimilation of these textures also leads to certain diseases of the skin, and to destructive suppuration of the cellular tissue. The elimination of sugar by the kidneys constitutes diabetes mellitus; and oxalic acid, combining with lime, forms the mulberry calculus.

193. This outline of the processes of primary and secondary assimilation must be received with reserve, as a theory undoubtedly true in some parts, and a fair inference from observation; but in any case as suggestive of useful reflections and important inquiries, and sure to lead, even if only partially true, to practical results, by laying a broad and secure foundation for a sound humoral pathology.

194. The food has now been traced through the processes of digestion, chymification, and chylification, to its commixture with the mass of the circulating fluid. How the milk-white contents of the thoracic duct are converted into red blood, or, to speak more precisely, how the red globules which are superadded to the colourless constituents of the blood are formed out of the materials supplied by the lymph, we are, in a great degree, ignorant. It has, however, been shown that the lymph itself contains lymph-corpuscles differing from the red particles chiefly in colour, and in all probability destined to form the groundwork of them. The next subject for examination is the blood itself.

195. *The Blood.*—This fluid, as it circulates in the vessels, is of a very compound character; for it not only contains within itself, as derived from the food, the elements of the several tissues of the body, and consequently the materials for their formation, nourishment, and growth, but also all the new elements into which these tissues are resolved when no longer fit to form constituent parts of the frame.

196. The quantity of blood contained in the adult body is variously estimated at from 8 to upwards of 30 pounds. Valentin estimates it at $34\frac{1}{2}$ pounds for the male, and 26 pounds for the female.

197. The specific gravity of the blood is about 1055. It has been known to reach 1059 in robust men, and to fall as low as 1050 in women. In pregnant women it has been found as low as 1045. It is also of low specific gravity in very young infants.

198. The temperature of the blood is about 100° Fahr.

199. The colour of the blood is bright red in the arteries, and dark red in the veins. It is fluid when circulating in the living textures, but coagulates in from three to seven minutes after removal from the body.

200. The blood consists of red particles or globules, to which it owes its colour, and of a transparent and colourless fluid, consisting of serum holding fibrin in solution, and known as *liquor sanguinis*, or *plasma*.

201. The blood in coagulating separates into two parts, the crassamentum, or clot, and serum. The clot is formed by the coagulated fibrin enveloping the red globules and a portion of the serum: its consistence, therefore, depends upon the relative quantity of these constituents. When the fibrin is large in proportion to the other constituents, the clot is firm; when it contains much serum, it is loose.

202. As it is usual to examine the blood after its abstraction by bleeding, with a view to a more accurate knowledge of the state of system in which the remedy was prescribed, and especially in reference to the existence of inflammation, it will be necessary to describe somewhat minutely the different appearances which the clot assumes.

203. The appearances supposed to indicate the existence of inflammation, to justify the past abstraction of blood, and to warrant a fresh recourse to the lancet, are a buffed surface or coat, and a cupped appearance. When the blood presents both these characters, it is said to be *buffed* and *cupped*.

204. Healthy blood drawn from a vein, and suffered to remain at rest, undergoes two principal changes, the one consisting in the subsidence of a portion of its red particles, the other in a coagulation of the mass of the fluid. The subsidence of the red particles begins to take place as soon as the blood is drawn; the coagulation rapidly follows, and in about ten minutes converts the blood into a loose jelly. The blood thus transformed from a homogeneous fluid into a nearly homogeneous solid undergoes a further change, which is often not complete till after the lapse of twenty-four hours or more. This change consists in the progressive contraction of the fibrin in the lower part of the mass, so as to entangle the red particles and press out the serum; and this mass of fibrin and red particles floating in the expressed serum constitutes, as has just been stated, the clot.

205. The layer of liquor sanguinis on the surface of the clot occasions the buffy coat, the hollow or cupped appearance of which arises from the strong contraction of the fibrin of this liquor sanguinis freed from red particles by previous subsidence. The lower portion of the clot, which consists of fibrin and red particles, is larger and looser. Hence the clot is not unlike a cupping-glass in shape.

206. According to this view, the formation of the buffy coat may be brought about by more causes than one. If the red particles retain their natural specific gravity, while that of the liquor sanguinis is diminished, or if the red particles have a greater specific gravity than usual, whilst the liquor sanguinis has its normal density, or, again, if the red particles have an unusual tendency to coalesce and adhere (as has been shown to be the case in inflammation), they will sink rapidly, and the separation between the upper and lower parts of the clot will be complete. The opposite conditions of the two portions of the blood will, of course, produce opposite results. If, whilst the contractility of the fibrin remains the same in two cases, the quantity is increased in one and diminished in the other, the clot will be large in the one case and small in the other; on the other hand, if the quantity of fibrin remaining the same in two cases, the contractility is great in the one and small in the other, we shall have the cupped appearance in the former, whilst the surface of the clot will remain comparatively flat in the latter. The thickness of the buffed surface will depend upon the quantity of the liquor sanguinis which has separated from the rest of the clot; and this quantity will vary with the time which elapses before the fibrin begins to contract. The slower the coagulation, therefore, the thicker the buffy coat. A great diminution in the quantity of the red globules would favour the complete separation of the liquor sanguinis, and become *a cause of the buffy coat.*

207. In the process of coagulation, then, there are two stages or steps—the subsidence of the red particles and consequent separation of the liquor sanguinis, and the contraction of the fibrin. The quantity of the liquor sanguinis, and the consequent thickness of the buffy coat, will vary directly as the rapidity of the coagulation and the density of the globules; the surface of the clot will be flat or hollow as the contraction of the fibrin is more or less firm; and the size of the clot will vary directly as the quantity of the fibrin, and inversely as its contractility. When the contractility is slight, the serum is imperfectly pressed out of the liquor sanguinis, and the serum and red globules from the remainder of the clot; when, on the other hand, the fibrin contracts strongly, it diminishes the size of both portions of the clot.

208. The separation of the liquor sanguinis and the degree of contraction of the fibrin, which so greatly modify the appearance of the clot, are themselves influenced by a variety of causes. Thus the separation is more complete, and the buffy coat, *cæteris paribus*, more strongly marked when the blood is drawn in a full stream into a deep vessel; the reverse takes place when the stream is slow and the vessel shallow. The temperature of the blood itself, and of the place in which it is kept, also exerts an influence, warmth being favourable to complete separation. The same is true of exposure to the air. The size of the stream and the depth of the vessel probably affect the separation by retaining the warmth for a longer or shorter period.

209. The contraction of the fibrin is also strongly influenced by the shape of the vessel in which the blood is drawn. Thus, in one experiment performed by Dr. Babington, the clot formed in a pear-shaped vessel weighed scarcely half that formed from the same blood in a common pint basin; that is to say, the fibrin contracted more firmly, and pressed out a larger quantity of serum and red globules in the former case than in the latter.

210. Seeing that such slight causes can influence the formation of the clot, it is scarcely to be expected that much reliance should be placed on the cupped and buffed appearance of the blood as a sign of inflammation, unless great precautions are used to insure an accurate resemblance of one observation to another in every respect.

211. But even where, as in the experiments of M. Andral and others, such precautions have been adopted, a cupped and buffed appearance of the blood has been observed in diseases unaccompanied by inflammation. This appearance, for instance, was observed in sixty-four per cent. of cases of chlorosis. It was, however, still more frequently met with in acute rheumatism and inflammatory sore throat.

212. The mere presence of the buffy coat, therefore, is by no means a sure indication of the existence of inflammatory action: all that it indicates is, that there is an alteration in the relative quantities of the fibrin and the red globules, or an excess, either absolute or relative, of the fibrin. The fact that the buffy coat may occur in diseases not

characterised by acute inflammation should put us on our guard against placing too much reliance on the phenomenon as a sign of pre-existing inflammation sufficiently severe to justify the abstraction of blood.

213. The quantity of the *crassamentum* (the combination of fibrin and red globules with a variable proportion of serum) varies within wide limits. The blood of men contains, according to Lecanu, more of the chief constituents of the crassamentum—viz., fibrin and red globules—than that of women: they are also more abundant in the sanguine temperament than in the lymphatic.

214. The number of the *red particles* evidently differs in different persons at different times, and it probably varies with age, sex, temperament, and state of health. According to the researches of Becquerel and Rodier, the quantity by weight varies from 113 to 152 parts in a thousand; the average for healthy males being 141 parts, and for healthy females 127 parts.

215. Each of the red particles of the blood consists of a capsule, and a nucleus, with an interspace supposed to be filled with colouring matter. When the blood is mixed with water the particles swell by imbibition; but if mixed with syrup, or a liquid of greater specific gravity than the blood itself, they are observed to shrink and become puckered from the exudation of their liquid contents. It is probable, therefore, that by swelling when the specific gravity of the blood is reduced, and shrinking when it is increased, the red particles may serve to maintain a more uniform consistence of the circulating fluid.

216. A practical application is made of this effect of fluids of different consistence on the blood corpuscles. When we wish to examine a spot of dried blood under the microscope, in the hope of detecting some of the red particles in their entire state, we employ as our solvent either serum, or a saline solution, or a syrup of about the same consistence as the serum of the blood.

217. The capsules and nuclei of the red particles are variously affected by chemical agents and by some of the secretions. The bile, for instance, completely dissolves the blood corpuscle.

218. The proportion of *fibrin* in healthy blood varies from 1½ to 3½ parts in a thousand, the average being 2½. It is more abundant in arterial than in venous blood, in about the proportion of 5 to 4.

219. The *serum* is a straw-coloured fluid, holding albumen in solution. On the application of a temperature of 167° Fahr., the albumen coagulates, and separates. This coagulation and separation of the albumen take place equally when the serum is mixed with other liquids, such as the urine: so that heat becomes a test for the presence of serum in the urine, and a valuable sign of the existence of a certain form of disease of the kidney.

220. The fluid which remains after the separation of the albumen is called the serosity. It consists of salivin, casein, lactic acid, and osmazome, with salts (*principally of soda*) dissolved in water.

221. The quantity of the several constituents of the serum varies in the two sexes, at different ages, and in different temperaments. The quantity of *water* is greater in females than in males; in children and aged persons than in persons of middle age; and in the lymphatic temperament than in the sanguine. In healthy males it has a range of from 760 to 800 parts in a thousand, and an average of 779; and in healthy females, a range of 773 to 813, with an average of 791. The quantity of *albumen* ranges from 62 to 75 parts in a thousand, the average being about 70 parts.

222. In addition to the parts now mentioned, the blood contains, in minute quantity, a variety of principles, which are destined to be removed from the body by the various excreting organs, especially by the kidneys. When these excretions are checked from any cause, the materials which ought to have been removed from the body accumulate in the blood, and may be detected by chemical reagents.

223. The blood is supposed to have an independent principle of life. The best argument in support of this view, is the fact that blood is developed in the ovum previous to the formation of vessels. Whether this be the case or not, the blood exercises an important influence on the functions of all the organs of the economy, nor can its composition be materially changed without serious consequences to health.

224. The blood undergoes various changes in disease. These consist of—(*a*) Sensible changes; (*b*) Variations in the relative proportions of its constituent parts; (*c*) The admixture of substances foreign to its composition in health.

225. (*a*) *Sensible changes.*—The *quantity* of blood is increased in plethora, and of course diminished in cases of hæmorrhage and after long abstinence. It is also said to be diminished in anæmia; but the pallor of the surface, which characterizes that disease, may be occasioned solely by a deficiency of colouring matter. Its *temperature* is increased in many diseases accompanied by a rapid circulation, as in severe inflammations and inflammatory fevers: on the other hand, it is diminished in languid states of the circulation, and especially when the blood is imperfectly decarbonised, as in apnœa, poisoning by prussic acid, cholera, and cyanosis. The *colour* of the blood is more florid in the cases in which its temperature is raised; and of a darker hue in those in which its temperature is lowered.

226. (*b*) *Variations in the relative proportions of its constituent parts.* The *red particles* are in excess in plethora, and in defect in anæmia. They are more slowly reproduced than the other constituents of the blood, hence the long continuance of pallor after hæmorrhages. The *fibrin* is increased in acute inflammations, especially of the serous membranes, in acute rheumatism, pneumonia, phthisis, erysipelas, cynanche tonsillaris, and absorbent inflammation. The greatest increase takes place in acute rheumatism, in which disease it is sometimes nearly three times as great as in health, and continues in excess after

repeated bleedings. It is also in excess in the pregnant female. On the other hand, the quantity of fibrin is diminished in fevers which are not inflammatory, in cerebral congestions and hæmorrhages, in scurvy, in profuse hæmorrhages, and in inflammation of the mucous membranes. The quantity of the *serum* increases as that of the *clot* diminishes. The quantity of *water* in like manner increases as that of the more solid ingredients decreases. It is in excess in anæmia, and in chronic diseases accompanied with great debility. The quantity of the *albumen* probably bears a near proportion to that of the fibrin: it is greatly diminished in cases of Bright's disease. The *salts* of the serum are diminished in typhoid fever, and in cholera morbus.'

227. These facts are stated chiefly on the authority of Andral and Gavarret,* to whom we are indebted for the following table of the variation observed in the quantity of the chief constituents of the blood in disease, compared with the average in health.

Fibrin varies between	10·5 and	0·9 per 1000 parts—average in health	3
Globules . . .	185	21	127
Solid matters of serum	114	57	80
Water . . .	915	725	790
Inorganic matters of serum . . .	8	5	8

228. (*c*) *Admixture of substances not found in the blood in health.* These are of four kinds:—1. The results of mal-assimilation of the food. 2. The elements of the natural secretions and excretions. 3. Morbid secretions of the blood itself; and 4. Poisons introduced from without.

229.—1. Sugar, which is secreted in a certain quantity by the liver, is sometimes found in undue proportion in the blood as the result of mal-assimilation in the stomach, and oxalic acid found in combination with lime in the urine, is presumed to have existed as such in the blood itself.

230.—2. The elements of the secretions and excretions accumulated in the blood, in consequence either of disease of the proper excreting organs, or of the excessive production of those elements during primary and secondary assimilation, are chiefly the following: urea, lactic acid, fatty matter in excess, colouring matter of the bile, cholesterine, free carbon, and casein.

231.—3. Of the morbid secretions of the blood itself, the chief is pus, which, under certain circumstances, is absorbed from the veins or from suppurating surfaces, and carried into the circulation.

232.—4. Almost all poisons introduced into the stomach, by wounds, or by the unbroken skin, find their way into the blood, and may be detected there by appropriate tests. Among vegetable products may be mentioned alcohol, hydrocyanic acid, chloroform, camphor, opium, indigo, and rhubarb; among animal substances, musk; among minerals, arsenic, antimony, baryta, lead, copper, mercury, and silver.

* Annales de Chimie et de Physique, Nov. 1840.

To these may be added iodine, and the ferrocyanate and nitrate of potass.

233. The various constituents of the blood are separated from it, and thrown out among the textures of the body, or on the surface of membranes, or discharged by the several outlets. Fibrin plays an important part in every process of reparation; water and serum are formed in the sacs of the serous membranes, and in the cellular tissue; the red globules escape in peculiar states of debility; while in cases of inflammation, accompanied by loss of substance, a new fluid (pus) is formed.

234. The chyle and lymph which are continually added to the blood bring with them many useful and some hurtful principles which must be excreted from the body. The organs by which this is effected are the lungs, the skin, the kidneys, and the liver.

235. *Respiration.* The air-tubes, after repeated divisions and subdivisions, terminate in small vesicular cells, upon the walls of which a minute capillary net-work of blood-vessels is distributed. The membrane which constitutes these cells, and through which the atmosphere acts upon the blood, is believed to be at least thirty times as extensive as the surface of the body. The lungs, therefore, constitute one vast excreting surface, from which is constantly escaping into the air a mixed cloud of carbonic acid gas and water, an interchange of carbonic acid gas and oxygen taking place through the membrane of the cells. This elimination of carbonic acid gas and absorption of oxygen are accompanied by the well-known change in the colour of the blood from dark blue to light red.

236. Viewed as excreting organs, the lungs have this peculiarity, that they require for the due performance of their functions not merely the contact of atmospheric air, but its constant renewal. For this purpose the walls of the chest have been made to undergo alternate expansion and contraction, simultaneously with the depression and elevation of the diaphragm. These alternate movements of inspiration and expiration take place, on an average, in healthy and well-formed adults, eighteen times in a minute.

237. The whole volume of the air in the lungs is not renewed at each inspiration. After ordinary expiration it has been calculated that 108 cubic inches of air remain in the lungs; and it is probable that the quantity subject to change does not exceed 15 cubic inches. At this rate, and supposing the number of respirations to be twenty in the minute, no less than 432,000 cubic inches, or 250 cubic feet, of air will be required to support the function of respiration during twenty-four hours. This, however, is on the supposition that the body remains during the whole of that time in a state of rest; but under ordinary circumstances of alternate rest and exercise, there can be doubt that this estimate will have to be very greatly increased.

238. From a calculation based on the assumption that $10\frac{1}{2}$ ounces

of carbon are eliminated from the lungs and skin of an adult male in 24 hours, it may be inferred that the quantity of air required to support the functions of the lungs and skin during that time (no portion of air being used more than once), falls very little short of 2000 cubic feet; so that if a human being were shut up in a perfectly close apartment, opened only once every 24 hours, he ought to have that space allotted to him. On the same principle, a close bed-room occupied during a night of eight hours, ought to have nearly 700 cubic feet of air for each occupant. This space can only be safely curtailed where sufficient ventilation is practised; but the space allotted to each individual during 12 hours, whether by day or night, ought in no case to fall greatly short of 1000 cubic feet, that is to say, a cube 10 feet in each dimension. In buildings for the reception of the sick, this quantity ought to be increased at least one half. In apartments occupied for shorter spaces of time, 75 cubic feet per hour would be a sufficient allowance.

239. The quantity of air drawn into the lungs at each inspiration, has been just taken at 15 cubic inches; but there is no point upon which the results of experiment differ more widely than this. Vierordt has shown that in his own person the quantity at one time may be nearly five times as great as at another, the minimum being 11, an average of the maxima 43, and the mean of all his observations 31; and Valentin, by experiments on young adult males, whose respiration was tranquil, or only somewhat quickened, obtained a minimum of 14, a maximum of 95, and a mean of 40 cubic inches. The principal experimenters on respiration give estimates or measurements founded on experiment, ranging from a minimum of 12 cubic inches (Goodwyn and Abernethy), to a maximum of 40 cubic inches (Turin and Menzies).

240. According to the lowest estimate, the quantity of carbonic acid gas formed in twenty-four hours amounts to 14,930 cubic inches, or 8,534 grains; according to the highest, to 39,600 cubic inches, or 18,612 grains. The mean of the three estimates (Lavoisier and Seguin, Davy, and Allen and Pepys) is nearly 28,736 cubic inches, or 14,985 grains. The quantity of carbon removed from the blood will therefore be, according to the lowest estimate, 2,820 grains, according to the highest, 5,148, and the mean of the three estimates will give 4,273 grains, or nearly 10 ounces avoirdupois. This estimate falls short by a quarter of an ounce of that given by Dr. Dalton. (§ 266.) Liebig found that an adult taking moderate exercise expires daily from the lungs and skin an average of 13·9 ounces of carbon.

241. Air once respired contains nearly 6 per cent. carbonic acid; but however frequently the same air is breathed, it never contains more than 10 per cent. The respired air is diminished by about $\frac{1}{21}$ of its volume. This decrease is probably owing to the absorption of oxygen. When pure oxygen is breathed, the quantity of carbonic acid given off from the lungs is increased.

242. Dr. Prout's experiments show that the quantity of carbonic

acid generated in a given time is greatest between 11 A.M. and 1 P.M., smallest between 8½ P.M. and 3½ A.M. It is therefore less at night than during the day. It is also less in females than in males; in young and old than in middle-aged persons. It is increased by repletion and exercise, and lessened by fasting and rest. It is also diminished by depressing passions, by fatigue, by spirituous liquors, tea, or vegetable food, and by the long-continued use of mercury. Carbonic acid is also given off in larger quantity when the barometer is low, and the quantity is greater for low than for high temperatures.

243. Besides carbonic acid, water is exhaled in large quantity from the lungs. In twenty-four hours this quantity amounts, according to the estimates of different authorities, to from 2,880 to 13,704 grains, or from about 6½ ounces to one pint 11 ounces.

244. The chief function of the lungs, then, is to free the blood from carbonic acid and water. The separation of carbonic acid from the blood, and the absorption of oxygen, is necessary to enable that fluid to act as the efficient stimulus to all the functions of the frame, and to minister to its growth and nourishment. The suspension of respiration for a few minutes is fatal to life, and the circulation of blood not purified by respiration exercises an injurious influence on all the organs of the body, but particularly on the nervous system.

245. The quantity of carbonic acid exhaled from the lungs is greatly increased in the first stage of small-pox, measles, and scarlatina, as well as in various chronic diseases of the skin. On the other hand, the quantity of the gas is diminished in typhus fever.

246. The lungs also serve as channels through which many volatile matters taken into the stomach escape from the system almost unchanged; and the sweet breath of some healthy persons and the tainted breath of cachectic patients proves that they may also serve as the avenues through which other volatile matters contained in the blood, and found within the system, find their way out of the body. Bernard's experiments also prove that the lungs are the channels through which sulphuretted hydrogen introduced into the circulation escapes from the body; and it is reasonable to suppose that other gaseous substances contained in the blood pass out of the body in the same way.

247. *The Sweat.*—The *Skin* performs functions of great importance in the economy; for it not only separates from the blood substances which would be injurious if retained in it, but also regulates the temperature of the body by the evaporation from its surface. The chief constituents of the sweat are water and carbonic acid. To these may be added nitrogen, ammonia combined with lactic acid (according to some, with acetic acid), urea, osmazome, and a variety of salts.

248. The carbon eliminated by the skin in twenty-four hours amounts, according to Dr. Dalton, to a quarter of an ounce, being a very small fraction of that given off from the lungs. Sometimes carbonic acid is exhaled with nitrogen, sometimes nitrogen alone is given

off, and at others neither of them is present. The quantity of these gases also varies considerably; but it appears that nitrogen is most abundant after animal, and carbonic acid, after vegetable, food. The quantity of these gases is increased by food and by muscular exertion.

249. The total exhalation from the skin amounts, according to the estimate of Dr. Dalton, to 6¾ ounces in twenty-four hours. The more accurate experiments of Seguin give 7 grains per minute in a male in a state of rest, which would amount in twenty-four hours to little less than 1½ lb. avoirdupois, a quantity certainly much too high for the entire day.

250. The aqueous exhalation is partly mere evaporation, and partly a secretion. The *evaporation* is affected by common physical agents. It is increased by a dry and warm atmosphere, by air in motion, and by diminished pressure of the atmosphere; it is lessened by moisture, by stillness of the air, and by increased atmospheric pressure. The *secretion* is increased by these and by internal causes, such as excitement of the circulation, provided that that excitement does not rise too high. On the other hand, it is diminished in a state of complete rest.

251. The perspiration is *diminished* when other secretions are greatly increased: thus the skin is dry in diarrhœa, diabetes, cholera, and dropsy. The perspiration is also diminished in the cold stage of intermittent and continued fevers, and at the commencement of all febrile affections. In these cases the secretion is deficient, from the small quantity of blood circulating through the vessels of the surface. On the other hand, whenever the quantity of blood is greatly increased, as in acute inflammations, in the hot stage of fever, and in the febrile exanthemata, the same result follows.

252. The secretion from the skin is *increased* in the sweating stage of intermittent fevers; in continued fevers of the less severe kind; in catarrhal and miliary fevers; and in inflammatory affections, when the febrile symptoms are not very severe. The secretion is also increased when determination of blood to the skin is combined with debility of the capillaries, as in hectic fever, especially in that which attends phthisis pulmonalis, in puerperal fever, &c. In extreme debility, again, the perspiration is augmented in consequence of the debility of the capillary vessels, though the quantity of blood circulating through those vessels is diminished. Such are the cold sweats, which precede dissolution. The perspiration is also very abundant in acute rheumatism, and in hypertrophy of the heart.

253. The *odour* of the perspiration, which is naturally sour, is heightened in catarrhal, rheumatic, and arthritic diseases, in childbed affections, and in intermittent fevers. In mania and in pulmonary consumption the sweat sometimes has a peculiarly offensive odour. The acid odour is due to the presence of acetic and lactic acids.

254. Sweats are sometimes partial, as in phthisis; sometimes general, as in the sweating stage of fevers. General sweats are commonly preceded by partial ones.

255. Remedies act on the skin chiefly through the circulation, some by diminishing its violence when it is too rapid, others by increasing the action of the heart when it is too languid. The passions of the mind also affect the secretion from the skin, by exciting or depressing the heart's action, the more agreeable emotions producing a warm, moist glow, the stronger depressing emotions, copious cold perspirations.

256. *The Urine.*—This secretion subserves the twofold purpose of removing a portion of the liquid and solid matters which have been taken as food, and the greater part of the materials resulting from the disorganization of the tissues. It consists of water, some effete animal matters, as urea and uric acid, certain saline matters, together with certain constituents of the chyle, and various substances which have entered the circulation. In quantity, it amounts to more than half the solid and liquid ingesta.

257. Its most important constituents are water, urea, and uric acid. The latter ingredients consist of the following elements:—

	Nitrogen.	Carbon.	Oxygen.	Hydrogen.
Urea contains	47	20	27	7
Uric acid „	31	40	27	2

258. This table shows that urea and uric acid contain a very large proportion (urea nearly fifty per cent.) of nitrogen, and that they are the principal means by which this gas is eliminated from the system. These elements vary with the quality of the food; they are increased by animal, and diminished by vegetable, diet; they are almost absent in infants at the breast; and go on increasing towards manhood.

259. The quantity of the urine is increased by the suppression of other secretions, and lessened by their increase. This increase and decrease are most observable when the cutaneous exhalation is affected. As the urine is a secretion which attracts special attention at the bedside, it will be more minutely examined in the next Chapter.

260. *The Bile.*—This secretion has been not inaptly described as a soapy fluid, consisting of a peculiar principle, bilin or choleic acid, in combination with soda. This peculiar principle, which constitutes about nine-tenths of the solid constituents of the secretion, contains in every hundred parts, 64 of carbon, 9 of hydrogen, 3 of nitrogen, and 24 of oxygen. The solid constituents of the bile are dissolved in about nine times their weight of water. The quantity of bile secreted in 24 hours has been estimated at from 17 to 24 ounces. If, in the absence of precise data, we take that quantity at one pint, and suppose it to weigh 9000 grains, it will follow, that as the solid constituents of the bile form one-tenth of the entire secretion, their weight will be about 900 grains. As, again, nine-tenths of the solid constituents of the bile have been shown to consist of bilin or choleic acid, it follows that about 810 grains of this substance are secreted daily. Now 64 parts in 100, or rather more than three-fifths of this, consist of carbon. This will

give for the carbon contained in the bile nearly 520 grains. As the quantity of bile which is daily voided with the fæces is very small, not exceeding about a scruple in weight, more than an ounce of carbon must find its way into the intestines, be absorbed from their coats and carried into the circulating system, to serve as prepared fuel for the lungs. (§ 179, et seq.) A smaller quantity of hydrogen, amounting to about one-seventh of the quantity of carbon, would have to be similarly disposed of.

261. By the excretions which have now been examined (those of the lungs, skin, kidneys, and liver), the blood is freed from useless or hurtful matters. These excretions have been examined separately; but it will be useful to consider them collectively, and to show what share each bears in removing from the blood those ingredients which are poured into it from the thoracic duct, the joint product of the chyle and lymph, or, in other words, of the food and of the effete textures of the frame.

262. For this purpose, the experiments of Dr. Dalton may be employed. An average of fourteen experiments made on successive days in the month of March gave the following result, the urine and fæces being ascertained by weight, and the proportion of the secretion of the skin and lungs by calculation.

The ingesta weighed 91 ounces. The egesta were as follows:

Urine 48½ oz., fæces 5 oz., exhalation from the lungs and skin, 37½ oz.; of which 30¾ oz. by the lungs, and 6¾ oz. by the skin.

It appears, therefore, that of the whole amount of the ingesta, more than one-half was excreted by the urine, a third by the lungs, about a thirteenth by the skin, and an eighteenth by the bowels.

263. By far the largest proportion of these excretions, and consequently of the food and drink by which they are supplied, consists of water. In the whole 91 ounces, the quantity may be estimated at 76 ounces, and the water contained in the several excretions may be thus stated:—

Urine 45¼ oz., fæces 3¾ oz., lungs 20½ oz., skin 6½ oz. Total, 76 oz.

Thus it appears, that of the superfluous water contained in the blood, about five-eighths are removed by the kidneys, somewhat more than a fourth by the lungs, rather less than one-twelfth by the skin, and about a twentieth by the bowels.

264. The separation of water from the body is evidently an important use of these excretions, and it is easy to understand how one of these organs may become vicarious of another in this respect. Thus, when the exhalation from the skin is increased by exercise or by any other cause, the urine is diminished; when, on the other hand, as in diabetes, the quantity of the urine is increased, the skin becomes dry and harsh. The functions of the lungs and skin, in like manner, are closely connected. When during exercise the skin is moist, the respiration is free; but if, the skin being dry, the circulation is at the same

time excited, the respiration is difficult and frequent; but the moment moisture breaks out upon the skin, the lungs are relieved as by a charm, the respiration becomes natural and easy, and the body is freed from the load which oppressed it. The pedestrian will recognise the truth of this statement. It is the rationale of the "second wind" of those who take violent exercise.

265. The quantity of water removed by the bowels being comparatively small, has little effect on the other secretions; but if increased by the operation of a purgative, the urine is diminished, and in violent diarrhœa, and in cholera morbus especially, is often entirely suppressed. The exhalation from the lungs is also probably affected by the quantity of the secretions poured out by the other organs.

266. Next to the water which is thus removed from the system, the most abundant material excreted is carbon. It is eliminated by the different organs in the following proportions:—

Urine $\frac{1}{2}$ oz., fæces $\frac{1}{2}$ oz., lungs $10\frac{1}{4}$ oz., skin $\frac{1}{4}$ oz. Total, $11\frac{1}{2}$ oz.

A certain proportion of the carbon contained in the fæces is furnished by the bile, a secretion extremely rich in carbon, containing, as it does, about eighty per cent. of it. The rest of the carbon contained in the fæces has never formed a part of the circulating fluid. Hence the blood is purified of its carbon by the lungs, kidneys, skin, and liver. Of these organs, the lungs excrete so much the larger proportion, that no single organ, nor all of them jointly, can supply the place of the lungs, when their functions are much embarrassed.

267. The lungs and skin excrete carbon with oxygen, as carbonic acid; the kidney, with nitrogen and oxygen, and a small proportion of hydrogen, as urea and uric acid; and the liver, with oxygen and hydrogen, but scarcely any nitrogen, as bilin or choleic acid. As the carbon is similarly combined in the secretion from the lungs and skin, it is easily seen how the functions of the skin may become vicarious of those of the lungs. The relief afforded to the lungs during exercise by free perspiration probably arises in part from the excretion of carbonic acid; and the same may be said of the colliquative sweats in phthisis.

268. The close relation existing between the functions of the liver and lungs is proved by the frequent coexistence of diseases of those organs; that the one may be vicarious of the other is shown by the large size of the liver in the fœtus, compared with its size in the adult.

269. The essential constituents of the urine (urea and uric acid, but especially the latter,) contain carbon in considerable quantity. The formation of these substances in excess may therefore depend upon disordered function of the lungs, as well as on mal-assimilation of the food in the primæ viæ.

270. Nitrogen is at one time absorbed, at another time exhaled, by the lungs; it is exhaled by the skin in variable, but probably not in large quantity; it is nearly absent from the bile, but the appropriate

organ for its removal from the system is the kidney. In what degree other excretions may be vicarious of the kidney in this respect is not yet known.

271. The secretions of the skin, kidneys, and liver abound in salts; one of these organs may, therefore, to a certain extent, become vicarious of another in removing these matters from the system. The researches of Dr. Beale also render it probable that, in disease, certain saline substances are accumulated in large quantity at the seat of the disease, at the expense of some secretion of which they form a normal constituent. Thus chloride of sodium, found in excess in the sputa of pneumonia in the stage of hepatization, but absent from the urine, was restored to the urine on the subsidence of the disease.

272. In the similarity of the matters excreted by the several organs of the body, we recognise a provision for maintaining the normal constitution of the blood under the less severe functional disorders of those organs; while the efforts made by one organ to supply the place of another, probably account for some of the more familiar symptoms of disease. When these efforts are altogether unavailing, the constitution of the blood becomes seriously altered, and life itself is compromised.

273. The following table presents at one view the foregoing results of Dr. Dalton's experiments; the last three lines of the table being a rude approximation:—

	Pulmonary Exhalation.	Cutaneous Exhalation.	Urine.	Fæces.	Total.
Egesta . . .	30½oz.	6½oz.	48½oz.	5 oz.	91 oz.
Water . . .	20½oz.	6½oz.	45½oz.	3¾oz.	76¼oz.
Solid residue .	10½oz.	¼oz.	3 oz.	1¼oz.	14¾oz.
Consisting of substances containing—					
Carbon . . .	10½oz.	¼oz.	½oz.	½oz.	11½oz.
Nitrogen and other gaseous elements of urea and uric acid, exclusive of carbon .			1½oz.		1½oz.
Salts, &c.			1 oz.		1 oz.
Residue of undigested matters				¾oz.	¾oz.

274. Having now examined the function of digestion; the constitution of the blood, and of the various materials out of which it is formed; the secretions destined to further uses in the economy; and the excretions by which the blood is freed from useless or hurtful matters;—it remains to consider the mechanical arrangements by means of which the blood is renewed and purified, and subsequently distributed through the frame: in other words, to examine the functions of absorption, secretion, nutrition, and circulation.

It will be convenient to examine these functions in the following order:—the action of the heart; the motion of the blood in the arteries; the functions of the capillaries, of the veins, and of the absorbents.

2. PHYSIOLOGY AND GENERAL PATHOLOGY OF THE CIRCUALTING SYSTEM.

275. *The circulation.*—The heart is the centre of two incomplete circulations; one through the lungs, beginning at the right ventricle, and ending at the left auricle; the other through the body, commencing at the left ventricle, and ending at the right auricle; the two together forming a complete circulation, an uninterrupted stream of blood. A third circuit may be said to consist of the coronary arteries and vein, the former arising from the commencement of the aorta, the latter opening into the right auricle.

276. The parts which compose these three incomplete circulations consist of arteries, veins, and intermediate capillaries, all of which are always, and in all states of the living body, full of blood, though more or less distended as the quantity of the circulating fluid is increased or lessened.

277. Each of these incomplete circulations consists of an arterial trunk splitting up into numerous small branches, and of a venous trunk formed by the union, through the intervention of capillary vessels, of similarly numerous small veins. This, too, is the character of the circulation throughout the body—arteries dividing into small branches, and corresponding small veins uniting to form venous trunks. But to this rule the vena portæ, and the minute circulation through the kidney, constitute exceptions. A general view of the circulation of the blood, including the portal system, is given in Fig. 1, in which *a d* represents the circulation through the body, *b c* the circulation through the lungs, *e e* the exceptional portal system, and *g g* the lymphatic and lacteal system. The darker parts of the plan, on the left of the diagram, represent the venous system, and the lighter portions the arterial system. The arrows indicate the direction of the stream of blood. The circulation through the heart is sufficiently apparent without the use of letters.

278. *The heart's action.*— The *heart* is the prime source, and chief cause, of the circulation through the blood vessels. Expelling their contents more or less frequently, and more or less forcibly, in different persons, and in the same person at different ages and at different times, the ventricles send out at each contraction the blood which they have received through the auricles from the large venous trunks.

279. The average number of the heart's contractions in a minute may be set down at 70 for an adult male, and 80 for an adult female. The quantity of blood forced into the aorta at each beat of the heart in a healthy adult has been variously estimated at from two to five or six ounces; and the total quantity of the blood contained in the body at about thirty-two pounds (§ 196). Assuming two ounces to be the quantity expelled by the ventricle at each contraction, and thirty-two pounds to be the weight of the whole mass of blood, taking also the pulse at 70, and further assuming the whole quantity of the blood to

be always in the current of the circulation, it is obvious that a given portion of blood could not complete its circulation through the body in

Fig. 1.



less than three minutes and a half. Müller, however, estimates the time required at from one to two minutes, and Volkmann at 34½

seconds in the new-born infant, and 65¾ seconds in the adult male. Positive experiments made by Hering, on the horse, prove that the circulation may be completed in 25 or 30 seconds; and the still more accurate experiments of Mr. Blake, on the same animal, show that it is completed in from 12 to 20 seconds. The experiments of the latter gentleman prove that in the dog the circulation may be completed in as little as nine seconds; that the time required for a poison to pass from the jugular vein to the lungs, was four seconds; from the jugular vein to the coronary arteries of the heart, seven seconds; from the jugular vein to the carotid artery, from five to seven seconds; and from the aorta to the capillaries, four seconds. Bernard has also proved experimentally that sulphuretted hydrogen gas introduced in solution into the jugular vein of a dog begins to be eliminated from the lungs in three seconds, and when introduced into the femoral vein of the same animal in seven seconds.

The estimated quantity of the blood must, therefore, be too high, and the quantity expelled at each beat of the heart too low; or, what is perhaps as probable, the whole of the blood contained within the body is not constantly in the current of the circulation, but remains for a longer or shorter period in the capillary vessels, subserving the functions of secretion and reparation. The observed difference between the velocity of that portion of the stream of blood which is in contact with the internal coat of the vessels, and of that which occupies their central axis, is also another element in the explanation of the difference between calculation and experiment.

280. The force with which the blood is expelled by the left ventricle has been estimated at somewhat more than four pounds.

281. *The arteries.*—The blood sent out by the heart is distributed to every part of the body by the arteries. The larger arterial trunks are highly-elastic tubes, destitute of muscular fibre, admitting of expansion both in a transverse and longitudinal direction, and capable of adapting themselves to the volume of their contents. With each contraction of the heart they are both expanded and slightly curved; and the ingenious experiments of Poiseuille show that they undergo a positive increase of size, amounting, in the carotid artery of the horse, to $\frac{1}{23}$ of the capacity of the vessel.

The larger arteries, by yielding to the impulse of the blood and reacting upon it, cause a delay in its motion which would not occur in the case of rigid tubes; hence the pulse is somewhat later in the arteries remote from the heart, than in those near to it. This same elasticity also equalizes the motion of the blood in the smaller vessels, and causes it to flow in a continued stream. It also accounts for their empty state after death, the blood which they contain being forced into the veins. In old age this elasticity of the arteries is lost by the degeneracy or ossification of their coats.

282. Though the dilatation of the arteries cannot be seen by the eye, and has been proved to exist only by the use of ingenious instruments,

the large arteries may be seen to throb. This change of position is owing to the longitudinal extension of the vessel with each beat of the heart. The vessel, in fact, is stretched and curved outwards by the forcible injection of blood; and if the finger be applied to the vessel with a tolerably firm pressure, this effort at change of place is felt. But this is not all; for the pressure exerted by the finger is resisted by the blood forced into the artery at each beat of the heart, and this resistance is also distinctly felt. These two things together, the change of place which the artery undergoes, and the resistance to pressure offered by the blood injected by the heart, constitute the Pulse, which will be more minutely examined in the next chapter.

283. The smaller arteries which communicate directly with the small veins, or from which the capillaries spring, possess two muscular coats, the inner longitudinal, the outer circular. In certain cases of obstruction to the circulation through the capillaries, these muscular fibres are hypertrophied, and may be very distinctly seen under the microscope, as has been shown by Dr. George Johnson in the case of the minute arteries of the kidney. The arteries intermediate between the large trunks and their smaller branches, have more or less of muscular fibre in their structure as they approach to the one or the other class of vessels.

284. *The capillaries* are the smallest vessels in the body. They form a network, between the meshes of which the proper substance of each organ lies, or they are variously disposed so as to adapt themselves to the form and arrangement of the several tissues; and they establish a communication between the last divisions of the arteries, and the commencement of the veins. The small arteries which do not lose themselves in veins have no other termination, and the veins no other origin, but this; and there are no vessels terminating by open mouths. This continuity of the arterial and venous system through the intervention of the capillary vessels is well shown in the annexed engraving of the small vessels in the interior of the villi of the small intestine (Fig. 2), in which the shaded vessels represent the veins, and the vessels in outline the arteries.

Fig. 9.



285. The capillaries are not, as has been sometimes supposed, canals drilled in the substance of organs, but distinct vessels, with a single membranous coat, through which the portion of the blood destined for secretion or nutrition finds its way.

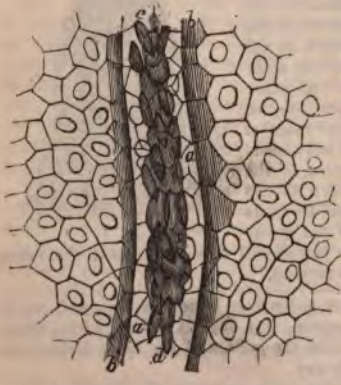
286. The motion of the blood in the capillaries is chiefly dependent

on the heart's action; its constant and equable flow on the elasticity of the arterial trunks; and some modifications, at present little understood, on the muscular contractions of the smaller arteries, and on the processes of secretion and nutrition going on in the parts to which the capillaries are distributed. The motion of the blood is less rapid in the capillaries than in the arteries, owing to the great resistance offered by the capillaries themselves—a resistance calculated at from two-thirds to three-fifths of the force of the heart.

287. In health, the capillaries subserve the important functions of nutrition and secretion by allowing of the ready exudation through their thin membranous wall of the materials which the several tissues require for their growth and repair; in disease, they play an important part in the changes known as *inflammation*, *irritation*, *congestion*, &c., a knowledge of the real nature of which changes is of the utmost importance to the practitioner.

288. In health we are familiar with some marked changes which the minute arteries and capillary vessels undergo, and these changes will enable us to understand disease. The emotion of shame causes the cheek to blush; the emotion of fear blanches it. Warmth, generally or locally applied, produces redness of the skin; cold, on the other hand, makes the skin pale. Exercise, likewise, reddens the surface; and continued rest restores it to its usual colour. Now, the blush of shame, the redness produced by heat, and the glow from exercise; and the pallor produced by fear, by cold, or by continued rest, are all dependent upon changes taking place in the circulation through the small arteries and capillary vessels.

Fig. 3.



289. There are three distinct ways in which it is conceivable that this increased or diminished redness of the surface, due to changes in the small vessels, may be brought about:—the rapidity of the circulation may be increased or diminished, so that more or fewer red particles (*c*, *d*, Fig. 3) may traverse the vessels (*b*) in the same time; or that portion (*a*) of the calibre of the vessels which is nearest to their coats, and which has been shown in tranquil states of circulation to transmit a colourless fluid, may admit the red particles; or the size of the vessels may be in-

creased or diminished. Observations made on the circulation of the blood in the frog's foot (Fig. 3) have demonstrated the soundness of all these suppositions. The velocity of the circulation is seen to vary; the outer portion of the calibre of the vessels to admit red particles; and the size of the vessels to increase or decrease.

290. In the examples just adduced we have three distinct causes of what is called determination of blood to the skin: in the first case, an emotion of the mind; in the second, a local application to the vessels themselves; in the third, the increased action of the heart. From the first example it appears that the state of the small vessels may be changed without any increased action of the heart; for if the enlargement were due to that cause, the blush would not be confined to the cheek; the second shows that local applications will affect them in the same way, without disturbing the heart's action; and the third proves that precisely the same result may follow from the stronger and more frequent contraction of the heart itself. The cases in which paleness of the skin occurs are equally instructive, proving, as they do, the local effect of emotion in producing a change of an opposite kind in the condition of the small vessels, the equally local effect of cold, and the remote effect of a tranquil state of the heart's action.

291. To return to the state of the small arteries and capillary vessels when the colour of the skin is heightened. One change which those minute vessels undergo is that of dilatation. How is that dilatation caused? It has been stated that the small arteries are furnished with muscular coats. Their enlargement, therefore, must be due either to the force of the heart's contraction, or to the temporary relaxation of the contractile tissue. In the last example adduced, that of the skin becoming red from exercise, the small vessels are obviously dilated by the additional quantity of blood forced into them by the heart; but in the first two cases, the cause is strictly local, and in no way dependent upon the heart's action. Here, then, we have examples of the small arteries and capillary vessels dilating without any force from behind to fill them; in the one case, in consequence of an emotion; in the other, of a local application. But this local application itself (heat) is of a nature to expand the substance, whether living or dead, to which it is applied; therefore the effect, in this case, might be regarded in the light of a mere physical change, and not as a proof of any vital expansion of the vessels. This being granted, there would yet remain in the act of blushing an undeniable proof of a *vital* expansion of the small arteries, due to an influence conveyed through the nerves, and operating to produce a momentary diminution or suspension of the contractility of those vessels.

292. As the capillary vessels, properly so called, consist of a single membranous coat, without muscular fibres, it is probable that they are passive in the local changes which occur in the circulation of the blood, and that the rapidity of the circulation through them is determined by the state of the small arteries on the one hand, and the

greater or less vigour of the processes of secretion and nutrition on the other.

293. The cells, which are the parts immediately concerned in these processes of secretion and nutrition, are endowed with vital properties which exercise upon the circulation, through the capillaries, an influence probably not inferior to the whole *vis a tergo*. That the cells do exert such an influence, is proved by the entire arrest of the circulation through the capillaries of the kidney, as a consequence of the complete destruction of the cells lining the tubes which they supply. (Dr. George Johnson.)

294. It appears, then, that, in one instance at least, there is no other way of accounting for the enlargement of the minute arteries than by a diminution or momentary suspension of their contractility. Now, in inflammation, this same enlargement of the small arteries occurs; and the important question arises, is it due to the same cause? A grain of sand gets into the eye, pain is produced, and in a short time the vessels of the conjunctiva become filled with red blood, and obviously enlarged. Here there is no action of the heart to account for the enlargement of the vessels; for the other eye, which is equally affected by the general circulation, is not inflamed. The change, then, is strictly local. It cannot arise from an increased action of the arteries leading to the inflamed part, for any contraction of these arteries must have the effect of diminishing the quantity of blood passing through them to the inflamed part. What, then, can give rise to the dilatation of the small arteries but a temporary loss of their contractility; and what can account for this but an influence transmitted through the nerves to the coats of the vessels? Again, if a piece of ice is applied to the finger, the immediate effect is to contract the vessels; but as soon as the ice is removed, the pale skin becomes red; redder than the surrounding skin. Here, again, the influence of the heart's action in injecting the capillaries is out of the question, and we have a strictly local effect produced, consisting in a contraction of the vessels, followed by dilatation.

295. The contraction of the small vessels, which is here produced by cold, has been shown, by experiments under the microscope, to follow on the application of mechanical and chemical irritants, and of all substances capable of producing inflammation, and to be succeeded, after a variable interval, by dilatation of the vessels. Hence the objection which might be urged against this example, viz., that the contraction is a mere physical effect of cold, loses its force, and the general fact remains, that agents capable of exciting inflammation first act by contracting the small vessels, and that this contraction is followed by dilatation.

296. Can this be explained? Perhaps thus. It is a general law that all stimuli applied to any part of the body call that part into action for a time, and that that action is dependent upon nervous influence; but the nervous influence suffers exhaustion proportioned to its intensity and duration, producing in the part affected a condition the

very reverse of that which existed when the nervous power was in full force. In the special case now under consideration, the stimulant determines the nervous influence to the small vessels, and the proper function of those vessels—viz., their contractility—is for the time called into full play; exhaustion ensues, and then that same function is paralysed, the vessels lose their contractility, and yield to the blood which flows into them.

297. Microscopic observations (such as those of Mr. Paget on the bat's wing) have further shown that during this first period of contraction the flow of the blood is retarded; but that, when the vessels become dilated, the circulation is accelerated, to be again retarded after an interval of time. The small vessels in becoming dilated are also stretched and twisted, and here and there even become varicose. This dilated and varicose state of the small vessels is well shown in the annexed engraving from Valentin, after Harting (Fig. 4). In consequence of this increase of size, the vessels admit a larger number of red particles; and vessels which previously conveyed only colourless blood, now become carriers of red blood.

Fig. 4.



298. Such are the changes which take place in the inflamed part; but they are not long confined to the small vessels, for the larger arteries and the veins suffer the same dilatation; and if the inflammation prove severe and extensive, the arterial trunks themselves participate; and thus large portions of the body—a hand, a foot, a limb, or an internal organ—become so many congeries of enlarged vessels, which contain a larger quantity of blood than those of the corresponding part of the body. Thus, if severe inflammation attack one hand, it contains much more blood than the other; the radial artery of that side is evidently enlarged (partly from loss of contractility, partly from increased action of the heart); and if a vein of that side be opened, it will pour forth much more blood than the vein of the opposite side.

299. The increased action of the heart, which occurs in all acute inflammations, sends blood in greater quantity to every part of the frame, and gives rise to *symptomatic fever*. If the nervous system suffer much, it is accompanied with that disturbance of its functions which is termed irritation, and we have *constitutional irritation*, or *irritative fever*; if the system have been long used to the stimulus of ardent spirits, the loss of the accustomed stimulus, added to the increased flow of blood to the vessels of the brain, may give rise to *delirium tremens*; and should the power of the constitution have been

previously exhausted, the fever assumes the *typhoid* form in place of the milder form which it takes in the strong and robust.

300. It appears, then, that in every change which the smaller vessels undergo, the heart or the small vessels themselves are first affected; but that in acute inflammation both are ultimately involved, the heart sending forth more blood, and the small vessels receiving more. In this state, the *heart's action*, which is *muscular contraction*, is increased; the *action of the small arteries*, which is also muscular contraction, is diminished. There is, then, no such thing as increased action of the arteries, in the sense in which that term was formerly used: that which used to be called *increased* action, is, in fact, *diminished* action.

301. The account just given of the condition of the small arteries, veins, and capillaries, and of the circulating system generally, in inflammation, though, perhaps, sufficient for practical purposes, would lead to error, if adopted as a complete *theory of inflammation*. We have yet to take into account the organic tissues, to the functions of which the whole system of vessels is subservient—the arteries and veins as carriers of the blood to and from them, and the capillaries as the intermediate and connecting vessels through the membranous walls of which the tissues attract the materials of their growth and repair, and the fluid solvent of such portions of them as have served their purpose in the economy, and become effete.

302. The secreting cells which constitute the bulk of these tissues play a very important part in the production of inflammation. In those cases where the inflammation originates in an increased action of the heart, the function of secretion in the part affected is deranged by the turgescence of the vessels. The increased quantity of blood imposes on the secreting cells an amount of duty which they are unable to perform. Hence, the elements of the secretion accumulate in the blood, and the original turgescence of the vessels is increased and perpetuated. On the other hand, in those cases where the first link in the chain of causes is an accumulation in the blood of the elements of an important secretion, say of the bile or urine, the second link is the rapid destruction of the secreting cells, the third link the arrest of the circulation in the capillaries, and the last link of the local chain the dilatation of the small arteries, and an increased flow of blood. An increased action of the heart is all that is necessary to complete the idea of inflammation as it commonly presents itself.

303. An excellent illustration of the share which the secreting cells have in bringing about the phenomena of inflammation is afforded by the kidney, in inflammation of that organ. The first link in the chain of causes is a rapid desquamation of the epithelial cells lining the urinary tubes; the detached cells clog the tubes; the blood in the capillaries is arrested, blood or serum is extravasated from the Malpighian tufts, and inflammation is set up.

304. The processes of nutrition and inflammation are strictly analogous. In healthy nutrition, the cells which constitute the organic tissues attract from the blood, through the walls of the capillary vessels, the materials of growth and repair; while the liquor sanguinis, from which these materials have been abstracted, having dissolved the *débris* of the effete textures, is restored to the circulation by the absorbents and the veins. In adults, under ordinary circumstances, the formation of new tissues exactly counterbalances the destruction of the old; but during the period of growth, and in certain parts of the system, as the womb and breast, to meet an occasional demand for increased activity, the process of nutrition is more active than the work of destruction. The same thing happens in some cases of subacute inflammation, which terminate in hypertrophy. In healthy inflammation, too, as has been proved by microscopic examination, the capillaries under the increased attraction of the tissues pour out liquor sanguinis, or coagulable lymph rich in fibrin, and capable of developing cells by which the destructive effects of inflammation are repaired, or the tissues increase in bulk and firmness.

305. The enlargement of the capillary vessels in inflammation, then, is quickly followed by effusion. When the seat of inflammation is the cutis, as in the case of a burn, serum is thrown out from its surface under the cuticle, and a blister rises: when a mucous or serous membrane is inflamed, fluid exudes from its surface: when the cellular membrane is its seat, the effusion takes place into its cells. This effusion varies with the constitution and state of system, the condition of the part, and the intensity and nature of the inflammation; and may present every degree of variety between a lymph abounding in fibrin, and a lymph rich in granules or corpuscles.

306. The lowest degree of inflammation in any of these parts merely increases the quantity of their natural secretion—of serum, in the case of the serous membrane—of mucus, when the mucous surfaces are inflamed. A higher degree of inflammation causes the effusion of coagulable lymph (the fibrin of the liquor sanguinis) or of pus. The increased natural secretion of the serous membranes is *dropsy*, or, when of limited extent, *œdema*; that of the mucous membranes, *flux*. Both these membranes, when the inflammation is more intense, pour out fibrin or pus. Thus the inflamed pleura or peritoneum secretes fibrin, which glues its surfaces together, and, becoming organized, forms permanent adhesions; the mucous membranes, too, in states of severe inflammation, pour out coagulable lymph of such tenacity as to assume the shape of the tube in which it is formed, and even to be mistaken for the detached lining membrane itself. This occurs in the larynx, in croup; in the bronchial tubes, in a peculiar form of bronchitis; in the intestines, in dysentery; in the kidneys, in inflammatory affections of those organs. Of purulent secretion from serous membranes, empyema is an example; *and of the formation of pus from mucous surfaces, purulent ophthalmia affords an illustration.*

307. When the capillaries, dilated in inflammation, return to their natural size, and any fluid which may have been poured out into the surrounding textures is absorbed, the inflammation is said to terminate by *resolution;* when blood is thrown out, by *hæmorrhage;* when serum, by *effusion;* when fibrin or coagulable lymph is formed and organized, by *adhesion;* when pus is effused, by *suppuration;* when the part dies, by *gangrene.* Inflammation of mucous surfaces or of exposed portions of cellular membrane, accompanied by the effusion of pus, and the more or less rapid removal of the part affected, constitutes *ulceration.* There is also a peculiar consequence of inflammation nearly allied to suppuration, and designated as *ramollissement,* or softening.

308. The generic term inflammation is often qualified by other words indicative of its character. Thus we have *œdematous* inflammation, or inflammation terminating in, or accompanied by, *œdema;* *adhesive* inflammation, or inflammation terminating in *adhesion;* *suppurative* inflammation, or inflammation issuing in *suppuration;* *gangrenous* inflammation, or inflammation ending in *gangrene.* The terms *acute* and *chronic, healthy* and *unhealthy, common* and *specific, phlegmonous* and *erysipelatous,* are also used to designate varieties of inflammation.

309. When inflammation attacks the cellular membrane, whether in the skin or in the parenchyma of internal organs, it takes different courses according to its intensity. If the inflammation be slight, it terminates in *resolution;* if more severe, *effusion* may take place; if more severe still, *suppuration;* if still more intense, *gangrene.* If a portion of the cellular membrane die, or if the effusion of blood, serum, or fibrin, be so large in quantity as to distend and break down the cellular tissue, pus is thrown out in small detached portions, which, by the solution of the intervening parts, coalesce, so as to form one single collection of purulent matter, round which fibrin or coagulable lymph is thrown out, becomes organized, and constitutes a *cyst* or *sac.* This collection of pus in a cavity, bounded by a wall of effused and organized fibrin, is called an *abscess*—a term which, like the term inflammation, is qualified in practice by phrases indicative of its character or progress, such as the *acute* or *phlegmonous* abscess and the *chronic* abscess.

310. Sometimes the constitution is not strong enough to build up and organize a wall of fibrin about the dead part, and then the pus finds its way into the surrounding cellular texture, and a *diffused abscess* is the result; or the inflammation is of a peculiar character, as in erysipelas, and suppuration takes place with little or no adhesive inflammation.

311. In rare instances the pus which has been thrown out is absorbed, and the abscess is said to be *dispersed;* but in the majority of cases fresh pus is formed, which causes the abscess to increase in size, and to press with augmented force on surrounding parts. Some of these parts yield to the pressure, and then the abscess is said to *point.* If the abscess is near the surface, the skin itself offers the least resist-

ance; it is therefore protruded, and stretched more and more till it bursts.

312. When the matter of an abscess is discharged, the cavity which contained it contracts, the lining of fibrin is cast off, and the walls become a suppurating surface, upon which fresh fibrin is effused. Part of this fibrin becomes organized by vessels, which either form within it, and then connect themselves with those of the surrounding parts, or are gradually extended into it from those parts. These newly-organized portions of fibrin are arranged in the form of small rounded vascular points, placed side by side around the cavity, and called *granulations*. From the surface thus created pus is secreted, which serves to protect the granulations from the air. In healthy persons the granulations are numerous, small, and florid, and coated with pus of a creamy consistence, known to the older surgical writers as *laudable* pus. Unhealthy granulations, on the other hand, are large, pale, and flabby, and discharge a thin and flaky pus. The various appearances presented by the granulations, and the changes which they undergo with alterations in the general health, form a subject of interesting and instructive study to the surgeon.

313. When the cellular membrane is divided by a wound, and the two edges of the wound are brought close together, fibrin is effused, which, becoming organized, the wound heals; a narrow red line being left at first, which in process of time becomes pale. This is called a *cicatrix*, or *scar*, and the part is said to have healed by the *first intention*.

314. But the part may not heal in this simple manner, and then an open sore or *ulcer* is formed, presenting the same granulations as the walls of an abscess which has burst. These granulations, like those of an abscess, secrete pus, which moistens them and protects them from the air, while the pus which is nearest the surface, drying into a scab, renders the protection more complete. The new granulations, once completely organized, secrete fresh coagulable lymph, and this in its turn is organized so as to form new granulations; and thus the ulcer is at length filled up to a level with the surrounding skin, and covered by a layer of cuticle.

315. As a general rule, abscesses, whether in the integuments of the trunk or in the solid viscera of the body, tend towards the surface; but to this rule there are exceptions. If, for instance, an abscess form in an internal organ, such as the liver, its firm parenchyma may offer more resistance than the loose texture of an adjoining intestine: hence the abscess exerts its chief pressure upon the coats of the intestine; this pressure sets up adhesive inflammation of the two layers of serous membrane, they are glued together by coagulable lymph, the peritoneum and the coats of the intestine thus become one continuous texture through which the abscess, continually increasing, forces its way, till it bursts and discharges its contents. Sometimes the course of an abscess is more circuitous, as when an abscess of the liver finds its way through

the diaphragm, and discharges itself into the air-passages of the lungs. Sometimes, again, an abscess in a solid viscus discharges itself into the serous cavity which surrounds it. Abscess of the lung, opening into the sac of the pleura, is an example in point. As a general rule, the matter of an abscess takes the shortest course to its place of discharge. The most common exception to the rule is in the case of collections of matter formed beneath fasciæ, by which it is bound down and diffused.

316. *Ulceration* is very analogous to suppuration. Ulceration of the skin, for instance, begins with inflammation, and is followed by effusion of serum or pus. The vesicle or pustule breaks, and leaves an uneven surface, covered with flakes of lymph, and moistened with pus. This surface may either heal in the way just described, or it may extend and enlarge by the destruction of the skin and subjacent textures, running a course more or less rapid in different cases, according to the intensity of the inflammation. In ordinary cases the parts are removed gradually and almost imperceptibly; in other instances with great rapidity, when the ulcer is called *phagedenic;* in other instances, again, the inflammation is so intense as to cause the death of considerable portions of the cellular membrane, in which case it is called a *sloughing* ulcer; or, lastly, rapid ulceration may be accompanied by gangrene, constituting the so-called *sloughing phagedena*, or *hospital gangrene.* Ulcers are further designated as *acute* and *chronic; healthy* and *unhealthy, inflamed, indolent,* and *irritable; congestive, varicose, fistulous,* &c.

317. *Gangrene* is one of the terminations of inflammation; and the death of a limited portion of the cellular or other texture has been described as the occasional cause of abscess. The common boil may be mentioned as an example of a more extended death of the cellular tissue. But gangrene may take place without leading to the formation of an abscess. It may attack a limb, in consequence of the extreme debility of the circulation in it, and beginning in the foot, extend upwards, involving the entire circumference of the limb, until it reaches a part where the circulation is active enough to allow of adhesive inflammation, when coagulable lymph will be thrown out in a circle, dividing the sound from the dead parts; granulations will be formed, pus effused, and at length a natural amputation of the dead member will be effected. Thus, in consequence of the different effect produced by different degrees of inflammation, and of the various secretions thrown out in different stages of the process, the body is enabled to set limits to its own diseases, and to repair the most severe injuries.

318. Sometimes gangrene takes place without any accompanying inflammation, as in a limb of which the arteries are ossified, or in cases of poisoning with ergot of rye: this is distinguished as *dry* gangrene. A form of gangrene, from extreme languor of the circulation in the lower extremities, is peculiar to persons of advanced age, and is known as *senile* gangrene.

319. The most common constitutional or predisposing cause of gan-

grene is debility; the most common exciting causes are severe mechanical injury, the action of violent irritant substances, pressure, and intense cold; the immediate or proximate causes are a deficient supply of arterial blood, impediments to the return of the venous blood, and injury or division of the nerves. The term *mortification* is commonly used as synonomous with gangrene; and the word *sphacelus*, or *slough*, is generally employed to characterise a part not susceptible of being restored to life, and which must be thrown off from the body.

320. A complete description of inflammation, including its causes, its phenomena, its terminations, and the various modifications which it undergoes in different states of health, in every variety of constitution, and in every texture of the body, would exceed the limits of this work, and properly belongs to the province of the surgeon; but there is one species of inflammation which, on account of its great importance, must not be passed over in silence, namely, erysipelatous inflammation.

321. *Erysipelatous inflammation* is characterised by its tendency to spread over the skin or over the surface of membranes, by its attacking different parts of the body, either simultaneously or by *metastasis*, and by its contagious and infectious character. When its seat is the skin, the subjacent cellular tissue is more or less implicated, and the specific character of the inflammation is shown by the lymph which is formed being incapable of organization. In the milder forms of erysipelas, as in that which often attacks the face, the disease scarcely extends beyond the skin itself, when it is called *simple* or *cutaneous;* in the more severe forms, however, the cellular membrane is implicated, when the disease is known as *phlegmonous* erysipelas.

322. Closely allied to erysipelas of the skin, and indeed intimately connected with it, is that inflammation of the peritoneum which occurs in puerperal fever, associated with acute inflammation of the veins of the uterus and of other parts of the body, with purulent deposits in the joints, and in the liver, lungs, and other viscera. The coexistence of erysipelas on the skin with puerperal fever, of erysipelas on the infant and puerperal fever in the mother, and the occurrence of diffuse erysipelatous inflammation as the consequence of wounds inflicted in the examination of the bodies of women who have died of puerperal fever, fully establish this connection.

323. *Congestion* is a state of capillaries allied to that of inflammation. It consists of a passive enlargement of those vessels, unaccompanied by the symptoms of inflammation, unattended by effusion either of lymph or pus, but sometimes combined with an increase of the natural secretion of the part. This enlargement of the vessels is the effect of debility, and as such is apt to continue in parts in which the symptoms of acute inflammation have been subdued. It is of common occurrence in the aged, and in persons exhausted by long suffering. In addition to the capillary vessels, it involves chiefly the veins, whilst inflammation has its principal seat in the arteries. Hence the term *venous congestion*. Pressure is a common cause of this state: thus we

have congestion of the veins of the leg after long standing, congestion of the vessels of the head from wearing a tight cravat, and congestions in the lungs from impediments to the respiration.

324. *Congestion of the internal organs* of the economy is a condition of very frequent occurrence, and one which plays a very important part in the development of organic disease, and in the hæmorrhage and dropsy which so frequently accompany it. Some of the causes of visceral congestion, such as cold applied to the surface, a continued dry state of the skin in febrile disorders, the plethora induced by a rich and stimulating diet combined with insufficient exercise, and hypertrophy of the left ventricle of the heart, are very simple and obvious. The continued action of these causes leads sooner or later to organic disease in some predisposed organ, such as the brain, the lungs, the liver, or the kidney; and hypertrophy of the left ventricle of the heart, to organic disease of several of those organs.

325. But besides this general internal congestion, leading to organic disease of some one of the congested organs, there are instances of internal congestion confined to a single organ, and forming one link in a chain of very interesting and instructive pathological changes, analogous to those already described as belonging to inflammation, § 302 and 303.

326. If we take the kidney as an example, the primary source of the congestion would seem to be, in all cases, either an impure condition of the blood (the impurity consisting in the excess of some element which ought to be eliminated by the kidney), or a process of desquamation strictly analogous to that which takes place on the skin in scarlatina. In either case, the first morbid change consists in desquamation, or separation of the secreting cells. The cells are rapidly thrown off in large numbers, so that the tubes become clogged, and further secretion thereby impeded; or the tubes become altogether denuded of their cells. This leads to congestion of the intertubular capillary vessels, extending backwards to the Malpighian capillaries, which, according to the degree of congestion, pour out blood or serum; or, first, blood, and then serum. The blood thus poured out is partly discharged mixed with the urine, and partly separated into its constituent parts; the fibrin, and part of the colouring matter, coagulating in the tubes, and being voided in the form of cylindrical moulds. In simple desquamation of the kidney, these moulds have epithelium scales adhering to their external surface, but without oil globules. In more severe forms of disease, especially where the secreting tubes are denuded of their cells, oil globules are found blended with the epithelium scales. The local congestion thus set up, if extensive or of long continuance, constitutes an obstacle to the movement of the blood, which ultimately affects the centre of the circulation, and leads first to violent action, and then to hypertrophy, of the left ventricle. After a time, this state of hypertrophy causes congestion of other internal organs, with hæmorrhages and effusions of serum; indeed, the train of symptoms which is well

known to follow on hypertrophy of the heart due primarily to other causes.—(Dr. George Johnson.)

327. Similar changes occur in asphyxia, as was shown by the late Dr. John Reid. The carbonic acid accumulating in a quantity too large to be eliminated by the secreting apparatus of the lungs, turgescence of the capillary vessels ensues, and death supervenes before inflammation has had time to develop itself.

328. *Hæmorrhage*, as has been just stated, is a common consequence of the state of congestion, when it is termed *passive* hæmorrhage; but it is sometimes of a more *active* character, and appears to flow immediately from the arteries. Sometimes, again, as in many cases of hæmoptysis, it is caused by the rupture of an artery; at other times, as in hæmorrhages from the stomach and bowels, the blood seems to exude through the coats of the capillaries or veins. We may also have hæmorrhage into the ducts of secreting organs, such as the liver or kidney. In scurvy and in putrid fevers the hæmorrhage is due partly to weakness of the vessels, and partly to thinness of the blood. Hæmatemesis, melæna, and hæmorrhoids, are examples of passive hæmorrhages. The copious discharge of red blood from the bowels, traceable by the use of the speculum ani to a small spot in the mucous membrane of the intestine, is a good example of active hæmorrhage.

329. It yet remains to consider two important functions to which the capillaries are subservient—viz., those of *nutrition* and *secretion*. These two processes are essentially the same; for each consists in the development of simple cells endowed with independent vitality, and capable of assimilating from the blood their own peculiar fluids.

330. The *secreting organs* themselves assume various forms; but their essential parts are a basement membrane coated with epithelial cells, and covered externally with a network of blood-vessels.

331. In *nutrition* each separate cell runs through its course of gradual development and decay, the products of its decomposition (of which the first in order, as in all other forms of decay, is carbonic acid) being absorbed into the blood, and eliminated from the system by appropriate excreting organs.

332. In *secretion*, too, the epithelial cells which form the essential secreting organ are similarly built up, arrive at maturity by the absorption of materials constituting the secretion, and then break up and decay; but the products of this decomposition of the cells, blended with their contents, instead of being absorbed into the blood-vessels, are poured into tubes fitted for their reception and discharge.

333. The fluids poured out by the secreting organs are known as *excrementitious* and *recrementitious*; that is to say, they are destined to immediate expulsion from the body as being hurtful, or to serve some useful purpose in the economy.

334. To the class of *excrementitious* matters belong the urine, the

sweat, the water and carbonic acid exhaled from the lungs, a small portion of the bile, the secretions of the several mucous membranes of the body, the menstrual discharge, and the hair, cuticle, and nails. The milk and semen, though they answer no further purpose in the economy, differ from other excrementitious matters in not being injurious to the system.

335. Of the *recrementitious* secretions some (as the secretions of the salivary glands, stomach, liver, and pancreas) subserve the process of digestion; others (as the tears, and the watery secretion of the Malpighian tufts of the kidney) serve to cleanse the surface of the eye and the urinary tubes respectively; others again (as the sebaceous secretions of the skin, the mucus of the mucous membranes, and the aqueous secretion of the serous membranes), protect from injury, and facilitate the movements of, the parts which they moisten.

336. Another secretion not destined to immediate expulsion from the body consists of the fat which is deposited in the adipose cellular tissue, giving roundness to the form, facilitating motion, protecting the external parts from cold, and serving as a store of nourishment.

337. The fat forms an example of secretion into cells. Examples of secreting organs in the form of membranes are the serous membranes (the pleura, the peritonæum, the arachnoid, and the synovial membranes of joints); the mucous membranes (that lining the alimentary canal and the parts communicating with it, and that lining the urinary passages and organs of generation); and lastly, the skin, a compound organ containing a variety of secreting glands.

338. *Glands*, in the usual acceptation of the term, are of three kinds—1, collections of blood-vessels, as the spleen and the placenta; 2, lymphatic glands, which are similar congeries of lymphatic vessels; and 3, true secreting organs. These latter are of two kinds, the one secreting into cells a fluid destined to be again removed by absorption, *e. g.*, the thymus and thyroid glands; the other furnished with ducts for the discharge of fluids, which either subserve other purposes in the economy, or are thrown off as useless. These organs all consist of an excretory duct, which, if we trace it backwards from its trunk, divides into branches, and these again into others of smaller size, until the smallest terminate in blind extremities of various shapes, called cells, cryptæ, acini, &c. On the outside of these minute terminations, the capillary blood-vessels ramify, and the appropriate secretion permeating the invisible pores of these vessels, drops into the cell, crypt, or acinus, and thence flows into the duct. The blood which is not used in the secretion is returned by appropriate veins.

339. In the kidney, the secreting apparatus is more complicated, consisting of a tuft of vessels (the Malpighian body), which secrete water, and of tubes lined with epithelium which eliminate the solid constituents of the urine; the water serving to wash out these solid matters—an operation assisted, in reptiles and fishes, and probably in mammalia also, by the cilia which line a portion of the tubes.

340. Secretion, like nutrition, is subject to differences in degree and in kind. The natural secretion of a part is augmented by increased flow of blood, provided it be not excessive. Thus increased perspiration follows exercise, and diarrhœa ensues on slight inflammation of the mucous membrane of the bowels. It may also be increased by debility of the capillary vessels, when the circulation is languid, as in the cold sweats following a fainting fit or preceding dissolution. These two causes of increased secretion—augmented flow of blood, and weakness of the capillary vessels—combine to produce the night sweats of hectic fever. On the other hand, the natural secretion of a part is diminished when it receives a small quantity of blood; as is the case with the skin in the cold stage of fever; or when it receives much more than its usual quantity, as in the hot stage. In this latter case, as soon as the fever subsides, and the quantity of blood sent to the skin is diminished to a certain point, the sweating stage begins. The nerves, too, have great effect on the secretions, as is seen in the flow of tears from grief, joy, or other violent emotion, and in the effects of fear or anxiety on the skin, breasts, kidneys, and bowels. Mental emotion, however, checks some of the secretions. Thus fear, which increases the secretion of the skin, checks that of the salivary glands.

341. But the secretions vary in *kind* as well as in degree; in other words, they are liable to a variety of morbid changes. Thus, the serous membranes, which in health secrete but little serum, under a certain degree of inflammation, pour out an increased quantity, and dropsy results; a higher degree causes effusion of liquor sanguinis; a different and perhaps higher degree, of pus. The mucous membranes, according to the degree of inflammation, secrete a serous fluid, or fibrin, or pus, or all these secretions blended in different proportions, as may be observed in the course of a severe attack of catarrh.

342. Very serious consequences result from the suppression of secretions, or from the non-elimination of some of their important constituents. Jaundice affords an example of the suppression of an entire secretion, followed by symptoms of constitutional disturbance. The non-elimination of *urea*, or of its combinations, by the kidneys, is an example of the suppression of an important constituent of the urine, followed in slight cases by erythematous swellings and boils; in more severe ones, by gout and rheumatism; in extreme cases, by fatal coma.

343. What has been said of the similarity of structure in the several secreting organs will prepare us to view, without much surprise, the assumption by some of the secreting organs of the functions belonging to others. This is termed the *metastasis* of secretions. Familiar examples of this phenomenon are, the secretion of urine, or of a fluid very nearly resembling it, by the skin and several of the mucous surfaces; of bile, by almost all the secreting organs of the body, as in jaundice; of milk, by the skin and lungs; and of the menstrual flux, by the vessels of the nose, lungs, and stomach, and from the surface of ulcers.

344. *The veins.*—The veins are larger than the arteries, and have no elastic coat. The larger veins of the extremities also differ from the arteries in being provided with valves to prevent regurgitation, and give support to the column of blood which they contain.

345. The circulation through the veins is effected mainly by the impulse of the heart continued through the capillaries. It is also assisted by the contraction of the muscles of the extremities, which, aided by the position of the valves, presses the blood towards the heart. The movement of blood in the great veins near the heart is further accelerated by the act of inspiration, and partly, as some suppose, by the suction of the heart itself.

346. At each inspiration the cavity of the chest is enlarged by the descent of the diaphragm, and by the elevation and tilting outwards of the ribs. The enlargement thus effected tends to produce a vacuum, which must be prevented by the entrance of air, of blood, or of both. That the motion of the blood in the large veins is thus accelerated is shown by experiments, and by the phenomena attending the admission of air into a wound in the larger venous trunks. It has also been shown experimentally that at each systole of the heart a tendency to a vacuum exists in the pericardium, which is prevented by the blood of the large veins distending the auricles.

347. The assistance given to the venous circulation by inspiration is somewhat counteracted during expiration, when the pressure exercised on the contents of the chest causes regurgitation of blood into the larger veins. There is, however, a balance in favour of the circulation, the effect of inspiration being greater than that of expiration.

348. When the right auriculo-ventricular valve admits of regurgitation, the blood flows back into the descending cava and jugular vein, causing a *venous pulse*.

349. Experiments have shown that poisonous substances introduced into wounds soon find their way into the veins. This proves either that the veins themselves absorb, or that the capillaries which terminate in the veins possess this power. It is through this absorption into the circulation that poisons act; hence the efficacy of ligatures applied above wounds, of the abstraction of the blood below the ligature, and of the application of cupping-glasses, which answer the double purpose of a ligature and evacuator.

350. *Absorption* is of two kinds; the absorption of fluids and the absorption of solids, or interstitial absorption. The capillaries and veins have the property of absorbing fluids; but the lacteals and the absorbents, properly so called, are also provided, the one for the absorption of the chyle from the intestines, the other for the absorption of lymph from every part of the body.

351. Absorption is certainly effected in more ways and by more means than one. Living and dead tissues allow the passage of fluid and gaseous matters through them. This is called *imbibition*.

352. If two gases are in contact with the moist surfaces of a bladder one being within it and the other external to it, both will permeate the bladder till they are equally mixed. A gas, likewise, will permeate a moist bladder to mix with a fluid within it. This takes place in the lungs. Again, if a vessel be filled with water, and a moist bladder be tied over its mouth, so that the fluid is in contact with the bladder, and a salt be strewed over its surface, it will be dissolved by the water which permeates the pores of the bladder. If a tube filled with a solution of salt or sugar, and closed by a piece of bladder, be placed in water, the water permeates the bladder, mixes with the solution, and rises in the tube. At the same time a portion of the fluid contained in the tube traverses the bladder in an opposite direction, and this interchange takes place till the fluids on both sides of the bladder have become homogeneous. If the arrangement be reversed, so that the denser liquid is external to the bladder, and the rarer liquid in the tube, the liquid in the tube passes through the bladder, and gradually sinks to a lower level. These phenomena were called by Dutrochet "endosmose" and "exosmose."

353. Matters in solution pass into the capillaries, and thence into the venous blood, by this process of "endosmose," which goes on the more rapidly as the denser fluid (the blood) contained within the vessels is no sooner diluted than it gives place to a fresh portion, and thus endosmose takes place more completely, and goes on more constantly, than in fluids at rest.

354. This process of absorption by the capillaries and veins is very rapid. In a part free from epidermis it is almost instantaneous; and minute portions of fluid, or of substances held in solution, may not only be absorbed, but may be distributed through the circulating system in from less than half a minute to two minutes. In this way the rapid action of the more energetic poisons is explained; and it is only in very rare instances, if in any, that a different explanation must be resorted to.

355. The rapidity with which absorption takes place is well illustrated by the rapid passage of certain salts from the stomach to the kidney. In one experiment made by Westrumb, prussiate of potash was detected in the urine in two minutes from the time of its being taken into the stomach; and in the history appended to a cast of the Epispadian Arburg, in the museum of King's College, it is stated that fluids may be seen trickling from the ureters into the bladder in from two to three minutes after they have been swallowed.

356. Several agents affect the rapidity with which imbibition and absorption take place. Of these galvanism is the chief. Thus Fodere has shown, that when sulphate of iron is introduced into the peritoneum, and prussiate of potash into the pleura, five or six minutes usually elapse before the two substances combine, but that their combination is instantaneous when a slight galvanic current is passed through the diaphragm. *Again, distension of* the vessels retards ab-

sorption; depletion, on the other hand, accelerates it. Hence the use of venæsection in dropsy. Absorption also takes place more slowly in parts covered by dense membranes. The absorbing power of the skin, for instance, is much increased by removing the cuticle. Lastly, absorption is promoted by friction.

357. All these means of promoting absorption are used in the practice of medicine—*galvanism*, especially in the case of fluids effused into joints; *depletion* in dropsies of the skin and serous cavities; abrasion by blisters, followed by narcotic applications, in severe neuralgia; and friction of the surface, in order to introduce medicines and nutriment into the system in cases of extreme emaciation.

358. The absorption of fluids of less density than the blood is easily accounted for by endosmose, which probably takes place chiefly through the coats of the capillaries or veins, and it is by this means, as just stated, that poisons find their way into the system. But the absorbent vessels seem destined to take up and restore to the circulation the serum (that is to say, the liquor sanguinis, *minus* the fibrin that has been used to build up the solid textures of the body) which has exuded through the parietes of the capillaries. By the absorbents, too, it is most probable that interstitial absorption (absorption of the structure of the body itself) is brought about.

359. Of disordered function of the absorbent vessels little is known. Formerly all dropsical effusions were attributed to some fault of the absorbents, and remedies were given to promote absorption by stimulating those vessels into activity. There can be no doubt that the functions of the absorbents, like those of other vessels, vary in activity at different times and under different circumstances; but as the veins have been proved to possess the power of absorption as well as the lymphatics, it is difficult to assign to each class of vessels its proper sphere of activity, whether in health or disease. It has been shown, for instance, by direct experiment, that the veins absorb poisons; but it is no less clearly demonstrated by disease, that some poisons excite inflammation in the entire course of the absorbent vessels, and in the glands through which they pass: and this is attributed, and probably with justice, to the absorption of the poison by these vessels.

360. But whatever the share taken in the process of absorption by the veins and absorbents respectively, there is no doubt that the influence of the absorbents in the production of dropsies has been much exaggerated. These effusions arise in various states of system, and from various causes. Mechanical obstruction, venous congestion, inflammation, or debility, may give rise to an effusion of serum too abundant to be removed by the unaided, though still healthy, action of the absorbent vessels. If the obstruction be overcome, or the venous congestion removed, or the inflammation subdued, or the strength restored, the effusion ceases, and time alone is required to enable the absorbent vessels, whether veins or lymphatics, to take up the fluid which has been poured out.

361. The doctrine that dropsies are generally due to a defective action of the absorbents is in opposition to the notorious facts that patients suffering from dropsy are very readily affected by preparations of mercury, which must be absorbed before they can act, and that the adipose tissue in such patients is often very rapidly removed, so as to occasion great emaciation.

362. The known efficacy of venous distension in preventing absorption, and of depletion in promoting it, point at once to the most efficacious means of removing dropsical effusions, viz., bloodletting, and the increase of the several secretions. If there is sufficient strength of constitution, these means suffice for their removal; if not, tonics or stimulants must be combined with the antiphlogistic measures.

363. The absorption of solid diseased structures has also been attributed to the increased action of the lymphatics, but perhaps without sufficient reason. Pressure, friction, and electricity, as well as mercury and iodine, are as likely to affect the capillaries which are the cause of the morbid growth, as the lymphatics or veins which are instrumental in removing it—moderate pressure, by giving support to the capillaries; stronger pressure, by still further diminishing their size; friction and electricity, by stimulating the coats of the small arteries, and restoring their contractility; and iodine and mercury, by a local action on those vessels, whether through the skin, or more circuitously through the circulation. The cessation or gradual removal of such tumours by these agents may be much more satisfactorily explained in this way than by an action upon the absorbents.

364. In the case both of dropsies and tumours, the result would be the same, whether the capillaries, ceasing to secrete fresh fluids or solids, the absorbents, without any increase of activity, remove by degrees that which has been effused; or the capillaries, continuing to secrete, the absorbents are excited to a corresponding increase of activity. The only difference is this, that according to the former supposition, the cause is permanently removed; according to the latter, the effect is merely counteracted. The first supposition seems the most feasible.

365. The physiology and general pathology of the circulating system would be incomplete if some reference were not made to the peculiarities which mark the circulation through the *liver* and through the *brain*.

366. The function of the liver, and the nature of its secretion, have already been considered at some length in § 178. The peculiarities of the circulation through it have yet to be described. The liver differs from all other secreting organs in being supplied for the purpose of secretion with venous instead of arterial blood. It is true that the solid constituents of the urine are also secreted from blood which has already served the purpose of distilling water from the Malpighian tufts; in other words, a circulation analogous to that of the portal system of the liver exists within the kidney itself. But the liver furnishes the only example of a vein, *arriving* at the organ as such,

supplying blood for the purposes of secretion. The vena portæ is formed by the union of the veins of the stomach and intestines, of the spleen, pancreas, and gall-bladder, and of the mesentery and omentum. With a slight and unimportant exception, it gathers together the venous blood of the entire intestinal canal and of all the organs engaged in the work of digestion, conveys it to the liver, where it subserves the secretion of the bile, which secretion is again poured into the duodenum to aid in the digestion of the food, and to subserve the function of respiration. The position of the liver, intermediate between the whole apparatus of digestion, on the one hand, and the right side of the heart and lungs on the other, explains its liability to congestion from fulness of the portal system no less than from impeded circulation through the lungs.

367. The *brain* differs in some important respects from every other viscus. The viscera of the abdomen are contained in a yielding cavity with muscular parietes; those of the chest in a cavity consisting partly of bone and partly of muscle, but allowing of a considerable increase and diminution of size in all directions; but the brain is shut up in an unyielding cavity of bone. All these cavities are air-tight, but that of the cranium alone is both air-tight and unyielding, at least in the adult. It follows, then, that whilst all the cavities of the body must always be full, the cranium alone must always contain the same amount of matter, for the atmospheric pressure of 15 lbs. on every square inch of the surface of the body keeps the brain full, as it does a syphon. Now the brain consists of a mass of nervous matter, supplied with blood by a large number of vessels, and there is no reason to believe that this matter can suffer compression any more than so much water; at least the strongest pressure which can be exerted upon it in the living body would probably not be rendered perceptible by the most delicate instrument. It is also an undoubted fact that so long as the arteries and veins contain their due proportion of blood, the brain is not affected either by an increase or diminution of the pressure which it ordinarily sustains. A man who descends in a diving-bell thirty-four feet below the surface of the water, sustains an additional pressure of 15 lbs. on every square inch of his body, and yet his brain does not suffer. On the other hand, a man ascending a lofty mountain, or going up in a balloon, has the pressure on his body, and consequently on the vessels of his brain, materially diminished, and yet his brain is not affected. Thus the inhabitants of some of the valleys among the Andes, who live as far above the sea as the summit of Mont Blanc, suffer only half the pressure which the body has to bear at the level of the sea, and yet they enjoy health both of mind and body. Again, the head of the infant suffers severe pressure during birth, and the yielding cranium of the child allows of large accumulations of fluid, and yet the brain suffers nothing during birth, and often very little in hydrocephalus.

368. Mere pressure, then, does not affect the functions of the brain, and yet men are said to die of pressure on the brain. When blood, or

serum, or lymph are found on the surface or in the ventricles, or a tumour in the substance of the brain, or a larger quantity of blood than usual in some of its vessels, death is said to have been occasioned by pressure. This statement is incorrect; pressure there is none. How, then, is the fatal result to be accounted for? Simply thus: the brain, like all other organs of the body, is dependent for the due performance of its functions on its supply of blood, and a tumour or fluid within the cranium, by occupying space there, deprives the brain of a quantity of blood equal to its own bulk; and the functions of the brain suffer in proportion to the loss which it sustains. The functions of the brain most open to observation are voluntary motion and sensation, both of which are lost or greatly impaired. The less obvious functions—that is to say, the supply of nervous power to the more important viscera, especially those of circulation and respiration—are equally impaired: hence the infrequent pulse and respiration.

369. When blood is poured out suddenly, as in the more common form of apoplexy, the symptoms are often more strongly marked, though the quantity of blood effused is very small, than in cases of slow effusion or of the slow growth of tumours within the cranium; in which cases the brain adapts itself by degrees to the new circumstances in which it is placed. In most cases of apoplexy, indeed, the quantity of blood actually effused is too small to account for the serious disturbance of the functions of the brain, without taking into account, at the same time, the injury which the texture of the brain itself has suffered in the seat of the effusion, as well as the disturbance in the balance of the circulation which must have preceded the rupture of the vessels. That such a disturbance is in itself sufficient to account for the symptoms is evident, from reported instances in which all the symptoms of apoplexy have been present without a single morbid appearance after death, except a disproportionate quantity of blood in the veins.

370. Though the bony parietes of the skull may, as already stated, be looked upon as unyielding, and the brain as incompressible, it is obvious that some slight change of position may take place at the openings by which the blood-vessels and nerves pass in and out of the skull, and that the intimate connection existing between the vessels within the brain and those of the scalp and face may become a source of relief and safety in sudden determination of blood to the head. The flushed and turgid face which accompanies apoplectic seizures, and the engorgement or rupture of the vessels of the scalp, in cases of death by hanging or strangulation, in which the vessels of the brain contain only the usual quantity of blood, are familiar consequences of this vascular connection.

371. There are cases of apoplexy, then (that is to say, cases in which the functions of the brain are greatly impeded), of which no other cause can be assigned but a want of balance in the circulation through the brain. The cerebral arteries contain scarcely any blood, while the veins are full of it; and it must be obvious that the brain thus

imperfectly supplied is in as bad a condition as if it received no blood at all, or its vessels were filled with warm water.

372. When the venous blood is less decidedly in excess, the functions of the brain, of course, suffer less; and these slighter disturbances in the balance of the two circulations probably account for the various conditions of the mind in our waking and sleeping hours. On the other hand, if the circulation through the arteries be increased, instead of torpor of the functions of the brain we have the symptoms of excitement — heightened sensibility, strong muscular contractions, violent delirium, raving madness.

373. This balance in the circulation may be disturbed in various ways. Blood may be accumulated in the veins by pressure on the jugular veins or on the carotid arteries. As the change of arterial into venous blood is constantly going on, an arrest of the circulation in either direction will have the effect of increasing the quantity of venous blood in the brain, and this will be followed by sleep, more or less profound, by coma or apoplexy. External pressure, then, is one disturbing cause. An arrest of the heart's action, by putting a stop at once to the circulation through the brain, produces syncope, which differs from apoplexy merely in degree, the one arresting every function of the body, the other merely oppressing them more or less. A very feeble action of the heart will be attended with the same result; for the arteries of the brain receiving little blood, and the change from arterial to venous blood still going on, the brain must contain but a small quantity of arterial blood, and must consequently perform its functions imperfectly. Hence, the deep sleep or coma which often attends extreme debility, and hence the turgid condition of the veins of the head when death follows upon hæmorrhage or other debilitating cause. In these cases, however, an effusion of serum generally accompanies the turgescence of the veins.

374. The incautious use of the lancet in cases of inflammation of the brain often produces this very derangement of the circulation. The bold practitioner, not content with reducing the circulation through the arteries and veins to a state of equilibrium, carries depletion to the extent of greatly diminishing the quantity of the circulating fluid, and enfeebling too much the action of the heart. The arteries consequently receive little blood, the veins contain an undue proportion, the circulation through the brain becomes languid, the capillaries pour forth serum into the ventricles or on the surface, and the patient dies comatose.

375. All the organs of the body require, for the due performance of their functions, that the blood should traverse them with a certain degree of rapidity: a sluggish circulation, therefore, is attended with sluggish functions. This observation, of course, applies to the brain in common with all other parts of the frame; the effect, therefore, of a sluggish circulation through that organ will be a torpor in the functions which it performs—this torpor constitutes, according to its degree, drowsiness, sleep, or coma.

376. *Sleep* comes on, for the most part, at that period of the day, and in that posture, in which the circulation is the most sluggish, viz., at night, and in the horizontal posture. Now it may be stated, as a general rule, that the pulse falls towards evening, and it may be added, that it is less frequent in the horizontal than in the erect position of the body. These two circumstances, then, which favour a slow circulation of the blood, also favour sleep, and partly explain its occurrence. But other causes must be taken into account, such as the darkness and silence, the absence of the usual impressions on the senses, and the exhaustion of the nervous system. This exhaustion reacts upon the circulation, and the circulation, in its turn, reacts upon the brain. Sleep, then, may be considered as due partly to exhaustion of the nervous system itself, partly to the absence of impressions on the organs of sense, and partly to the languid circulation through the brain. The negation or absence of any of these conditions produces wakefulness. Intense cold, which is another familiar cause of sleep, probably acts, partly by causing an accumulation of blood in the interior organs of the body, and partly as a direct sedative. A languid circulation through the brain will result in either case. In the cold stage of ague, the same state of circulation exists, and the same condition of brain. When this is of long continuance or of great severity, deep sleep or coma occurs.

377. Among other causes of this state may be mentioned repletion, and a certain stage of intoxication. The sleep which follows full meals may perhaps be explained by the circulation through the brain of the products of digestion not yet fully converted into blood; spirituous liquors act as a poison—stimulant in a small dose, and narcotic in a larger one.

378. The circulation through the brain varies much with the posture of the body. In the erect posture, the heart, in sending blood to the brain, has to oppose the force of gravity; but in the horizontal posture the heart has but little resistance to overcome. Hence, when the heart is feeble and the system drained of blood, a sudden change from the recumbent to the sitting or erect posture will sometimes cause fatal syncope; and, on the other hand, a patient who has fainted in the erect posture is soon restored by being laid on the back. When the head is lower than the rest of the body, the return of the venous blood to the heart is opposed by gravity; the balance of the circulation is therefore destroyed, and coma is threatened. This unfavourable position, combined with sudden exertion, as in stooping to tie a shoestring or pull on a boot, is an occasional cause of apoplexy.

379. The fact that the flow of blood to the head is favoured by the recumbent, and retarded by the erect posture, suggests the treatment to be adopted in cases of disease of the brain. Where there is high arterial action, the head should be raised; where there is much debility, the body should be placed horizontally. Such changes of posture are often attended with the best effects: thus instances are recorded in which pain, intolerable in the horizontal posture, has been at once removed by assuming the erect position.

380. When, again, it is desirable to produce a sudden and strong effect on the system by the abstraction of blood, the patient should be placed in the erect posture, for the heart soon loses the power of sending the blood upwards to the brain, and fainting follows as a consequence. The same position should be adopted when it is our object to obtain the greatest effect with the least expenditure of blood.

381. Cerebral excitement is directly opposed to the states of sleep and coma, and arises from an opposite state of the circulation through the brain. The degree of violence displayed bears a pretty exact relation to the rapidity and force with which the arterial blood is circulated, and to the strength of the patient. In the strong and robust, the outward manifestations of the disturbance which the brain is suffering are violent, and the muscles contract with great force; but if the strength is much exhausted, the loud talking of furious delirium is exchanged for low muttering; the violent muscular efforts for subsultus tendinum; and the distinct impressions on the senses for muscæ volitantes, and tinnitus aurium.

3. STRUCTURAL PHYSIOLOGY AND PATHOLOGY.

382. In the two previous chapters the human body has been examined, first, as a chemical laboratory, in which the functions of digestion, assimilation, and sanguification are carried on; and, secondly, as an hydraulic system, by which the blood is distributed. It is next to be considered as an assemblage of minute structures, by which all the parts and organs are to be built up.

383. It has been already stated that the circulating system, consisting of arteries, capillaries, and veins, forms a continuous and unbroken, though most minutely-divided, reservoir of blood in motion. The arteries serve as carriers of pure blood *to* the several tissues, the veins as carriers of impure blood *from* them, while the capillaries, the immediate agents of growth and nutrition, connect the two classes of vessels.

384. As the capillaries have no open mouths, the tissues can be nourished only by transudation through their walls. The fluid employed in this work of nutrition is the *liquor sanguinis;* in other words, the blood itself less its red particles. As the liquor sanguinis contains both albumen and fibrin, and all the other elementary substances necessary to nutrition, it is obviously equal to the use thus assigned to it. Many of the capillaries transmit only this colourless liquid.

385. The liquor sanguinis exuding through the coats of the capillaries, and brought into contact with the tissues, subserves the purposes of nutrition and growth, by being converted into the cells so well described by Schleiden and Schwann.

Fig. 5.



386. Those accurate observers have shown that all the tissues of the body consist of cells, or are formed out of them; and that these cells are made up originally of three

distinct parts:—*c*, the cell-membrane: *b*, the nucleus, or *cytoblast*; and *a*, the nucleolus. These cells are developed in a fluid (in the case of the healthy tissues and of the new textures generated by healthy inflammation, the liquor sanguinis), which fluid has been termed the *cytoblastema*, or cell-producer. The cell, once formed, grows by its own inherent powers; and as it contains and is surrounded by a fluid similar to that of which it was formed, similar cells, with the same constituent parts, form sometimes within it, and sometimes external to it.

387. The cells, which have a rounded form (Fig. 5) when floating free in the cytoblastema, may increase in number so as to press against each other; in which case they assume, with more or less regularity, the hexagonal form that vesicles so circumstanced always put on. If the intervals between the cells are supposed to be occupied by a firm unorganized deposit, we have the essential elements of the harder tissues, such as cartilage or bone. If the cells, instead of being round or oval, are supposed to assume elongated forms, we have the elements of the fibrous tissues; and, lastly, if cells arranged in lines with their ends in apposition are supposed to have their opposed walls removed by absorption, we have the several hollow tubes, such as arteries, veins, absorbents, the sheaths of the nervous matter, &c.

388. This cell-theory is applicable not merely to the solid structures of the frame, but also to some of the fluids both in health and disease. Thus the red particles which float in the liquor sanguinis of the blood are nucleated cells; so also are the lymph globules.

389. The secretions of mucus and pus thrown out from inflamed surfaces, contain, in like manner, their peculiar mucus and pus-globules. In healthy pus formed on the surface of a wound, these pus-globules become organized, and constitute the successive layers of granulations. The superficial granulations present cells which resemble the pus-granules; in the deeper strata the nuclei are very distinct, and the envelopes polygonal from mutual pressure; while in the still deeper layers the envelopes of the cells are seen passing through all the gradual transitions of the fibres of areolar tissue.—(Henle.)

390. The cell-theory also admits of application to malignant morbid growths. The liquor sanguinis, or cytoblastema, which exudes through the capillaries, instead of furnishing the materials for healthy cells destined to build up healthy tissues, supplies the elements of cells of the irregular form of those depicted in the annexed engraving, and which form a constituent part of cancer.

Fig. 6.



391. But though the cell-theory applies to diseased as well as to healthy growths, it has a more limited application in pathology, many structural changes being dependent upon widely-different causes.

392. One class of structural changes, for instance, consists in a

simple mechanical enlargement of hollow organs, such as the stomach, large and small intestines, and urinary bladder, from habitual distension; of the veins of the extremities from pressure on the large venous trunks; and of the anastomosing branches of arteries as a consequence of the application of a ligature to the main trunk.

393. A second class of structural changes consists in *abnormal nutrition*, without any change in the minute texture of the parts affected. This abnormal nutrition may be excessive or defective. The former is called *hypertrophy*, the latter, *atrophy*.

394. The principal cause of *hypertrophy* is increased action: this is shown in the muscles of the athlete; in the heart when it encounters some obstacle to the circulation; in the uterus during pregnancy; in the mammæ of the female when secreting milk; in the mucous membrane of the bladder exposed to constant irritation from stone or gravel.

395. *Atrophy* arises from opposite causes; from disuse of parts, as of the muscles in the sedentary, in the paralytic, and in the bedridden; from obstruction to the flow of blood by ligatures; or from the operation of certain powerful medicines, such as iodine and the salts of lead. Internal organs may also become atrophied from a cause described in § 403. Atrophy is accordingly accompanied by paleness of the parts affected: hypertrophy by increase of colour.

396. Hypertrophy and atrophy are sometimes limited to one constituent part of a texture. Thus bone may assume an unusual hardness, from the crowding of several earthy particles into the space commonly occupied by a few. On the other hand, the bones are subject to softening, from an absence of the earthy matter.

397. A third class of structural changes consists of the effects of common inflammation (§ 304), due to common causes.

398. A fourth class comprises the effects of inflammation due to specific causes; such as the inflammation and suppuration of the lymphatic glands in syphilis, plague, and glanders, and from wounds received in dissection; the inflammatory affections of the skin which characterise the febrile exanthemata; and the local deposits or formations of pus in the lungs, liver, serous cavities, and joints which supervene upon phlebitis.

399. But in addition to these familiar structural changes, there is a large class of morbid growths which have been grouped in two leading classes, under the designations *analogous* and *heterologous*.

400. It has been already stated that the liquor sanguinis, acting as the cytoblastema or cell-producer, forms the matrix in which a variety of adventitious growths are deposited, such as the cellular, the serous, the fibrous, the cartilaginous, or the osseous. These adventitious growths are usually determined by the nature of the texture in or upon which they are formed; thus they resemble serous membrane in the cavity of the pleura or peritonæum, they are often cartilaginous in

joints, and bear a close resemblance to muscle in the uterus. Such formations are called *analogous*, because they are similar to those naturally forming part of the body. When such formations have no resemblance to natural structure, they are termed *heterologous*.

401. The class of *analogous* formations is a very large and a very important one, and comprises some of the most fatal diseases of the secreting organs, especially of the liver and kidney, as well as several morbid states of the heart and arteries.

402. Deposits of fat or oil-globules play an important part in the production of disease in some of the most important organs of the economy. They constitute the disease known as fatty degeneration of the liver, and certain forms of Bright's disease of the kidney. The fat is deposited in the epithelial cells of the secreting surfaces, and in the cellular tissue connecting the vessels. In disease of the kidney the secreting tubes lined with cells containing oil-globules are expelled with the urine, so as to furnish evidence during life of the character of the disease of which the kidney is the seat. The annexed illustrations show the mode in which the oil-globules are deposited in the cells of these organs. In Fig. 7, *a* represents healthy cells of the liver, free from fat-globules; and *b*, cells from a liver in a state of fatty degeneration. In Fig. 8, *a* represents healthy epithelial cells of the kidney, and *b*, cells loaded with fat-globules.

Fig. 7.



Fig. 8.



403. The first effect of these abnormal deposits of fat is to increase the size of the diseased organs without materially affecting their functions; but in more advanced stages of the disease the fatty deposits, by encroaching more and more on the vessels and secreting apparatus, impair the secreting power of the cells on the one hand, and restrict the supply of blood on the other. Hence, in extreme cases of fatty degeneration, the organs affected are reduced to a state of *anæmia*, and become quite unequal to the performance of their functions; and instead of increasing in size, they actually shrink from the cessation of nutrition and the absorption of the fat-globules, the deposition of which was the original cause of the disease.

404. But the agency of deposits of fat in producing organic disease is not limited to the secreting organs. It extends also to the several tissues of the body. These deposits are laid down, for instance, in the muscular structure of the heart, constituting fatty degeneration of that organ, and enfeebling it by encroaching on the space

which in health is occupied by muscular fibres. The form which this fatty degeneration assumes under the microscope is shown in the subjoined engraving from a paper in the "Medical Gazette," 1849, by Dr. Ormerod. The degenerated muscular structure is a frequent seat of calcareous deposit.

Fig. 9.



405. Fatty deposits are also of frequent occurrence in the coats of arteries, which are often found subject to this species of degeneration in subjects affected by similar disease of the liver and kidneys. They are known as *atheromatous* degenerations.

406. The situation of these deposits in the arteries is either the cellular membrane between the inner and middle coats, or the fibres of the middle coat itself. When they occur in the middle coat of the larger arteries, they take the place of the healthy structure, impair its elasticity, and lead to dilatation of the vessel. In the smaller vessels they are often carried to such an extent as to obliterate their cavities, and thus to cut off the supply of blood from the parts to which they are distributed. Thus, when the coronary artery of the heart is the seat of atheromatous formations, the muscular substance of the heart itself becomes atrophied. This class of deposits is found to obey the law of symmetry, attacking equally and similarly the vessels of both sides of the body.

407. The atheromatous deposits in the coats of the arteries often become the seat of ulceration, leading to perforation of the vessels and sudden death from hæmorrhage. When the ulcers make their way through the inner coat of the arteries, they project as ragged uneven tumours from the inner coat, and when they occur in the aorta, are frequent causes of abnormal blowing and sawing sounds.

408. In another very numerous class of cases the atheromatous spot becomes the nidus of calcareous deposit, and the vessel is said to degenerate into bone.

409. The small arteries, veins, and capillaries of the brain also are subject to fatty degeneration. Oil-globules are deposited in the transverse fibrous coat of the arteries, and in the corresponding coat of the veins. They may be seen under the microscope, either as "minute, shining, black-edged particles, like molecules of oil, thinly and irregularly scattered beneath the outer surface of the small blood-vessels," or as globules of larger size, more closely packed together, or in round or oval clusters, "like large granule-cells." The subjoined engraving, from a paper by Mr. Paget, in the "London Medical Gazette," 1850, shows the appearance of a small artery under this form of degeneration.

Fig. 10.



410. In consequence of this deposit of oil-globules, the even outline of the vessels is lost, and their proper structures gradually waste and disappear, so that the smaller vessels dilate into minute aneurismal pouches. The proper vascular structure being thus weakened, softening of the brain ensues, followed by rupture of the vessels. This is one form of apoplexy.

411. Another analogous formation consists in a deposit of semi-cartilaginous matter on the free surface of the lining membrane of the arteries. The most common seats of this morbid secretion are the valves of the heart and aorta, the larger vessels at the points where they give off branches, and the smaller arteries throughout their whole extent. Calcareous deposits, having the hardness of bone, are also of frequent occurrence in the heart and arteries as independent formations; that is to say, they take place where the structures have not previously undergone some other form of degeneration. The fibrinous deposits which attach themselves as *vegetations* to the lining membrane of the heart, more especially to that covering the valves, afford another familiar example of an *analogous* formation.

412. The interesting researches of Dr. Kirkes have attached a new and unexpected interest to these deposits on the valves of the heart. It appears that they occasionally become detached from the mitral valve, and, being borne forward by the current of the circulation, are lodged in one of the arteries of the brain, impede or stop the circulation through it, cut off the supply of blood to a portion of the brain, which becomes softened, and gives rise to hemiplegia.

413. Another instance of fatty degeneration has been pointed out by Mr. Canton in the *arcus senilis*, or white line which is seen at the outer margin of the cornea in many aged persons, in some persons who have passed the middle of life, and occasionally as early as 35 years of age. In some instances it is associated with fatty degeneration of other more important organs; but its value as a sign of such degeneration has certainly been exaggerated. Fatty degeneration of the ovum has also been shown to play an important part in bringing about abortion.

414. It will be seen, then, that deposits of fat, or oil-globules, whether in the cellular membrane uniting the vessels of secreting organs and in the coats of arteries, or in the epithelial cells of secreting membranes; whether continuing in their original form, and encroaching gradually on the healthy structure of the organs which they attack, or becoming the seats of ulceration, or of calcareous deposits; —play a most important part in the history of organic disease.

415. These fatty deposits may be confidently traced to the imperfect oxygenation of the carbon contained in the venous blood. The fatty degeneration of the kidney, for instance, is a common occurrence both in men and animals living in dark, filthy, and ill-ventilated places, where the air is unfit to support the process of combustion in all its

vigour, at the same time that the constitution is enfeebled. Again, the fatty degeneration of the liver and kidneys, the atheromatous deposits in the coats of the arteries, and the fatty degeneration of the heart, are often found in combination in the spirit-drinker, who is constantly introducing into his system a large supply of a liquid hydrocarbon, of which the gaseous elements attract the oxygen that ought to be devoted to the combustion of the carbonaceous matters derived from the food and from the effete textures of the frame.

415*. *Heterologous formations.*—These morbid growths may be divided into two classes—*non-malignant* and *malignant*. The first comprises *tubercle*, the second the several forms of *cancer*. Tubercular diseases generally come under the care of the physician; malignant diseases fall more commonly under the hands of the surgeon. But both classes may occupy either the external or internal organs of the body.

416. *Non-malignant Diseases. Tubercle.*—This is deposited on the surface of membranes, or in the texture of organs. It consists of a peculiar unhealthy lymph, and presents itself in two different forms —the one whitish gray, semi-transparent, and dense; the other yellow, opaque, and friable. The first may be changed into the second, but the second is never transformed into the first. The gray tubercle is found in small isolated portions, as in the air-cells of the lungs constituting miliary tubercles, or on the surface of serous membranes. The yellow variety is found in the same situations, as well as on the surface of mucous membranes, and in the substance of the several organs—in the follicles of the intestines, in lymphatic glands, in the liver, spleen, brain, uterus, &c. It assumes different forms according to its situation, sometimes being collected in a distinct mass, sometimes diffused through the tissues of an organ as a homogeneous cheesy matter; and it may be so thoroughly blended with the textures as to assume the very form of the organs attacked, which are then said to degenerate into it.

417. Tubercle may be resolved into albumen, fibrin, gelatin, salts of soda and lime, and water, with a small quantity of fatty matter. Under the microscope *miliary* tubercle presents a granular appearance, the granules being blended with nucleated cells, or *tubercle corpuscles*. The yellow variety also consists chiefly of granules, interspersed with minute spherules, irregular flakes, and numerous oil-globules, edged with a few perfect cells.

418. Tubercle is sometimes, though rarely, deposited before birth; is not common before the fourth year; is frequent between the fourth and fifth; less frequent, again, from this time till puberty; most frequent of all between puberty and the age of fifty. The lungs are its most common seat, so that after the age of fifteen it is almost never met with in other organs without existing in them at the same time. The state of constitution (*tuberculous cachexy*) which leads to their deposition may be either inherited or acquired.

419. Tuberculous matter is at first deposited slowly, and without exciting pain or inconvenience, and may remain in a quiescent state for a very considerable period. At length, in consequence generally of a common cold, or slight febrile attack, the tubercle begins to act as a foreign body, and sets up inflammation in the surrounding tissues. When this change takes place in the substance of the absorbent glands, serum and pus are poured out, and an abscess is formed, which slowly approaches the surface, and bursts, discharging the tubercle softened and broken down by the effused fluids. After the discharge of its contents, the walls of the abscess generally contract and heal. Tubercles in the lungs undergo the same change, the matter being expectorated; but sometimes the tubercle is converted into a chalky or earthy matter, which may remain quiescent for the remainder of life. When the seat of the deposit is the mucous membrane of the larynx or intestines, the membrane ulcerates.

420. Scrofulous subjects, besides being liable to tubercular deposits, are particularly subject to the chronic forms of inflammation, suppuration, and ulceration. The lymph effused, as the result of inflammatory action, is curdy, and wanting in consistence, the pus serous and flaky, and granulations, when formed, are large, pale, and flabby. Scrofulous children are very liable to pustular, scabby eruptions of the ears and mouth, which discharge a thin acrid matter. Scrofulous enlargement, inflammation, and suppuration of the absorbent glands, especially of the neck, and a similar affection of the mesenteric glands occasioning the disease known as tabes mesenterica, are also common in childhood.

421. It has been shown experimentally that tubercular deposits may be produced at will in animals by confining them in close dirty places, and feeding them on unwholesome food.

422. *Malignant Diseases.*—These heterologous formations resemble tubercle in affecting almost all the organs of the body, though exhibiting a preference for a particular class of structures; in being more or less frequently traceable to hereditary predisposition; and in their tendency to disintegration, and the consequent excitement of destructive inflammation of the parts affected. On the other hand, malignant growths are distinguished by their tendency to extend into surrounding textures, and, when inflammation has been set up, to progressively destroy them; by following the course of the absorbents and attacking the lymphatic glands; and by reappearing, after removal, in or near the cicatrix, or in some internal organ nearly connected, through the absorbent system, with the part first attacked. The true malignant growths may be all comprised under the general name of Carcinoma or Cancer.

423. *Carcinoma* (*Cancer*).—This term was originally applied to a malignant ulcer supposed to bear a resemblance to a crab (*καρκίνος*, cancer), but it now comprises many changes of structure which have little in common in their physical characters. Carcinoma may be divided into two species, *Scirrhoma* and *Cephaloma*. The varieties of *Scirrhoma*

are scirrhous pancreatic sarcoma, tissue lardace, matière colloide, cancer gelatiniforme; those of *Cephaloma* are vascular sarcoma, and medullary sarcoma. All these forms of carcinoma consist of compound cysts varying in their solid and fluid contents, growing from broad bases, or from narrow peduncles which, springing from a single spot, give to the tumour a radiated appearance: the smallest cysts are enveloped in a larger one. The various appearances presented by these tumours are due in great measure to the inflammation which takes place in them and in the surrounding textures, and to the entire or broken state of the several cysts themselves.

424. *Melanosis.*—This is an unorganized product, of a dark brown, dull bistre, or sooty-black colour. It is deposited in masses with or without cysts, or in patches on the surface of membranes. Sometimes it is met with in small points, and occasionally it has been found liquid, in accidental cavities. Its most frequent seat is the liver; but it is occasionally found in the eye, the skin, the brain, the lungs, the kidneys, and other glandular organs. Its chemical constituents are albumen, fibrin, and the salts usually found in the blood, with a colouring matter abounding in carbon. It is often found associated with other malignant growths, but is distinguished from them by the cells continuing free instead of being attached to the surrounding tissue.

425. Deposits of a black colouring matter are often found in the bronchial glands and on the surface of the lungs both before and after birth. Such deposits are not of a malignant character. It is also probable that malignant melanotic growths consist of this dark deposit blended with a true malignant structure.

4. THE NERVOUS SYSTEM.

426. The vital principle, which, in some shape or other, endows every part of the frame, and even the blood itself, with properties altogether different from those of unorganized matter, is more especially connected with the nervous system. The brain, as the organ of the mind, is the immediate source of volition, and the part to which all impressions on the nerves of sensation are ultimately referred; the spinal cord, a continuation of certain portions of the brain, is the immediate origin of the greater part of the nerves both of sensation and volition, and the brain and spinal cord together form the joint source from which all the nerves of sensation and voluntary motion arise, from which the mandates of the will are sent forth, and to which the intelligence of the senses is conveyed.

427. In addition to these important parts of the nervous system there is a separate centre of nervous influence in the sympathetic, which connecting itself, in a manner little understood, with the nerves of motion and sensation, presides over the functions of those organs which are most essential to life, and is the cause of most of those movements which are independent of the will, of many of those sensations by which life is preserved, and of those chemical changes which are peculiar to

organized beings. For the important movements of respiration, moreover, a peculiar set of nerves is provided.

428. But there is still another function, and a corresponding set of nerves, to which the attention of the profession has been strongly directed by Dr. Marshall Hall and Professor Müller,—the reflex function and the excito-motory system of nerves. There are certain parts of the body (chiefly the canals lined by mucous membrane, and especially their outlets), which, when irritated, excite contraction of the muscles subservient to the performance of their functions. Thus, if the lining membrane of the air passages is irritated, the respiratory muscles are thrown into violent action. Here there is no exercise of volition, and yet there is muscular contraction. Observations made in cases of paralysis attended with loss of sensation and voluntary motion, and experiments on decapitated animals, have further shown, that for the production of these effects it is not necessary that sensation or volition should be present. Hence it became necessary to suppose the existence of a separate set of nerves; one going from the skin, or mucous membrane, to the brain or spinal marrow; and the other, from the brain or spinal marrow to the muscles. The absence of common sensation and volition at once pointed to the spinal marrow, and not the brain, as the centre of union of these two sets of fibres; and what theory had pointed out as necessary, the scalpel, in the hands of Mr. Grainger, has shown to be true.

429. The following scheme, therefore, will represent the several orders of nerves, and the relations which they bear to the brain and spinal marrow.

(1.) The cerebral, or sentient and voluntary, of which the brain is the centre.

(2.) The true spinal, or excito-motory, of which the true spinal cord is the centre.

(3.) The ganglionic, or the nutrient, secretory, &c., of which the sympathetic forms the principal portion.

430. The first order of nerves comprises all the nerves of *sensation* (the olfactory, the optic, the auditory, the gustatory, and the nerves of touch), and all the nerves of voluntary motion, with their common centre in the cerebrum and cerebellum. The greater part of the nerves of touch, or common sensation, unite with the greater part of the nerves of voluntary motion to form the external portions of the spinal marrow, and in this manner communicate with the brain.

431. The second set consists also of two orders of nerves, of which, the one passes chiefly from the internal mucous surfaces to the interior parts of the medulla oblongata and spinalis, and the other from those parts of the spinal cord to muscles having peculiar actions subservient chiefly to ingestion and egestion. Some fibres of the same order of nerves are probably distributed to other parts of the body, such as the skin and the muscles of voluntary *motion*.

432. That part of the spinal marrow to and from which these nerves run, has been called the *true* spinal marrow, in contradistinction to those parts of it which are formed by bundles of cerebral nerves. The motions due to this system are termed *excited*.

433. The third class of nerves, or the ganglionic, consist of the *internal* ganglionic, or sympathetic, including some few fibres of the pneumo-gastric; and the *external* ganglionic, embracing the fifth nerve and the posterior roots of the spinal nerves. These latter nerves are supposed to be chiefly destined for the nutrition of the external organs.

434. The functions corresponding to the three divisions of the nervous system, then, are:—1, sensation and voluntary motion; 2, excitements to action without sensation, and combined motions without volition; and 3, nutrition, secretion, and the motions connected with them.

435. The nerves consist of minute fibres, enclosed in sheaths, distinct through their entire course, and terminating in the parts to which they are distributed, either by free isolated extremities, or by loops between every two fibres, or by a network, like blood-vessels.

436. Experiment has made us acquainted with the functions of the more important nerves of the body, but has left much yet to be discovered. It has also thrown light on the laws which govern the transmission of nervous influence, though it has left the nature of that influence involved in the same obscurity which hangs over the real essence of light, heat, or electricity.

437. The effect of the division of a nerve is well known. If the nerve be one of sensation, irritation of the branches or trunk of the nerve below the point of division causes no pain; if it be a nerve of voluntary motion, neither the will nor a stimulus applied to the nerve above the point of division can cause the muscle to which it is distributed to contract. On the other hand, if the voluntary nerve be irritated below the point of division, or the sentient nerve above it, motion takes place in the one case, and sensation in the other; the sensation being referred to the parts to which the nerve is distributed.

438. This law of sensation is strikingly illustrated in cases of amputation of an arm or a leg, where irritation of the divided extremity of the nerve is referred to the fingers or toes of the lost limb, even for years after its removal.

439. The fact that irritation of the trunk of a sentient nerve produces pain, not in the trunk itself, but in the parts to which its branches are distributed, admits of practical application, and tends to destroy our confidence in the division of nerves as a remedy for pains in the parts which they supply. The failure of this remedy in several cases of tic-douloureux has been satisfactorily explained by the discovery of some permanent cause of irritation, such as a tumour or spicula of bone, at the origin of the nerve.

440. Although pressure applied to a sentient nerve causes pain in the parts supplied by its branches, a still stronger pressure produces pain in the trunk of the nerve itself. Severe local injury to a nerve of sensation or voluntary motion destroys its power as a conductor of nervous influence, but it affects the nerve itself only locally; for irritation of that portion of the uninjured sensitive nerve which is in connexion with the brain produces sensation, and irritation of that portion of the nerve of volition in connexion with the muscles causes muscular contraction. When, however, a nerve of motion is stretched violently through its whole length, it loses its property of exciting muscular contractions, and sometimes the muscle itself loses its irritability, and cannot be made to contract by any stimulus, however powerful.

441. Experiments on animals have brought to light some properties of the nerves, which may be advantageously borne in mind by the pathologist. It has been proved beyond a doubt, that all stimulants applied to the nerves in the dead body, act in nearly the same way, and produce effects differing merely in degree; but the electric and galvanic fluids being the most effectual, have been generally selected for experiment. It has also been shown that the nerves, when stimulated by galvanism, do not act as mere conductors of the galvanic fluid, for the muscles contract when the galvanic current is made to pass transversely through the motor nerve. Again, it has been proved that the muscles cannot be made to contract by any degree of mechanical irritation applied to a nerve of sensation, while the slightest irritation of a nerve of motion gives rise to very strong contractions. Hence it appears that the nerves themselves possess a property of exciting muscular contractions on the application of stimuli, independent of the brain and spinal cord. It has been further shown that this property may be exhausted by the continued application of a stimulus, to return after an interval of rest.

442. These experiments on dead animals are in accordance with the results of observation in the living human body. The nervous power is exhausted also in the living body, and must be restored by rest. The exhaustion of the entire frame is repaired by sleep, and in parts of the body by repose, or change of action, which is but a form of repose. In the living body, too, stimuli, whether mechanical, chemical, or electrical, cause the nerves to which they are applied to manifest the characteristic properties with which they are endowed. Thus irritation of a nerve of common sensation causes pain; of a nerve of motion, muscular contraction; of the retina, the sensation of light; of the auditory nerve, that of sound; of the origin of the pneumogastric nerve, a derangement of the digestive process manifested by the elimination of sugar from the kidney. The stimulus of galvanism, too, excites in each organ of sense the sensation proper to it—taste in the tongue, a peculiar odour in the nose, light in the eye, a musical sound in the ear.

443. Some of the stimulants which have been mentioned, especially

heat, cold, and electricity, admit of application in disease. Both heat and cold cause the muscles to contract, and both in excess destroy the irritability of the muscles. Cold water injected into an artery causes contraction in the muscles which it supplies; and this fact has been taken advantage of in cases of uterine hæmorrhage after delivery, by injecting cold water into the vessels of the still-adhering placenta. The efficacy of cold suddenly applied externally or internally, in causing contraction of the uterus, is well known. The good effects of electricity and galvanism in exciting muscular contractions is manifested in some cases of paralysis.

444. Stimuli of great power and intensity, though applied only momentarily, may utterly destroy the excitability of the nerves, as happens with the optic nerve when a flash of lightning produces permanent blindness; and with the brain and spinal cord when it causes sudden death. Permanent paralysis may arise from the same cause. A weaker stimulus applied for a longer time may produce the same effect. Thus snow blindness sometimes follows the continued strong reflection of light on the retina, and paralysis of the muscles violent and long-continued exercise. Still weaker stimuli, or the same stimuli applied for a shorter period, impair the excitability of the nerves and cause fatigue. Thus the eye fixed for a long time on the same colour becomes fatigued, and at length insensible to the impression of that colour; and if the same set of muscles are kept in action only for a few minutes, as when we hold the arm extended, or continue standing in the same position, we feel extreme fatigue: but the slightest change of posture affords instantaneous relief.

445. Extreme exhaustion of the nervous power is always accompanied by severe pain. Thus, the long-continued application of the stimulus of light to the eye, or of the stimulus of cold or heat to the skin, gives rise to acute suffering; and the long-continued action of the muscles in walking, may occasion the most excruciating agony.

446. The application of stimuli, then, to the nerves of sensation or voluntary motion, produces, according to its degree and duration, entire destruction or great exhaustion of the nervous power, accompanied in extreme cases by severe suffering; and the functions of the nerves are not restored till after an interval of rest proportioned to the degree of the previous exhaustion. The brain and spinal cord are the sources whence the restorative influence emanates, and motor nerves, permanently cut off from those centres, lose their property of exciting the muscles to contraction.

447. Stimuli, then, first excite the nerves, and then exhaust their excitability; but there are substances known as *narcotics* which have the effect of directly deadening the excitability of the nerves, and, if applied in a concentrated form, of entirely destroying it. If, for instance, the ischiatic nerve of a frog be dissected, and allowed to hang in a solution of opium or morphia, the immersed portion of nerve is entirely deprived of its power of exciting muscular contraction,

and the leg of a frog steeped in a solution of opium, or of hydrocyanic acid, is paralysed. The same effect is produced upon the heart by infusions of opium and tobacco, and on the intestines, by opium and ticunas. Similar effects are produced on the human iris by the local application of extract of belladonna, on the muscles of the hands by the handling of lead, and on the sensation of the lips and tongue by chewing monkshood, and of the fingers by the vapours of strong hydrocyanic acid.

448. Narcotic poisons introduced directly into the circulation, or indirectly through the stomach or other circuitous channel, also produce a local action on the nerves. Thus, Müller having divided all the vessels and muscles of the thigh of a frog, poisoned the animal with nux vomica, and found that the irritability of the sound leg was lost much sooner than that of the leg of which the vessels and muscles had been divided. This loss of irritability in the sound leg could be attributed to no other cause than the circulation through it of blood containing the poison, and the consequent local effect of the poison on its nerves; and it is doubtless by such local effect on the parts of the nervous system most essential to life, or on the nerves supplying the heart or lungs, that narcotic poisons, after being absorbed and circulated with the blood, prove fatal.

449. It has also been proved experimentally that poisons act with greater force when circulating with the blood than when applied directly to the nervous trunks. Thus, strychnine applied in powder to the moist spinal cord of the frog, excites no twitchings of the muscles, while the most violent contractions are produced by very small quantities absorbed into the blood. Other experiments may be adduced to prove that poisons circulating with the blood produce their effect chiefly by acting on the spinal cord and brain. Thus, when an animal is poisoned with opium or strychnine, if the nerves of one of the limbs are divided, the spasms in that limb cease; and if the spinal marrow is cut through before an animal is poisoned with upas, the parts supplied by nerves from the lower portion of the cord are not convulsed. Narcotic poisons generated within the body itself also act fatally on the nervous centres through the circulation. Thus urea, which accumulates in the blood in consequence of the loss of power in the kidneys to eliminate it, acts on the brain, and proves fatal by inducing coma.

450. The foregoing observations apply chiefly to the nerves of sensation and voluntary motion, which have the brain and certain portions of the spinal cord for their origin and centre. There yet remain to be examined, as of great importance to the physician, the functions of the sympathetic nerve and of the excito-motory system of nerves.

451. *The Sympathetic.*—The functions of this nerve are threefold: it presides over the involuntary motions of the more important viscera of the body; it is the medium by which all impressions are conveyed

from those parts to the central organs; and it regulates the processes of secretion and nutrition in every part of the frame.

452. With regard to the first property of the sympathetic—that of presiding over the involuntary motions of the more important viscera—it has been ascertained by experiment that the parts which this nerve supplies, as the heart, the intestinal canal, &c., continue to move long after they are separated from their connexion with the rest of the sympathetic system, and even after their removal from the body, whether the motions are rhythmic, as in the beats of the heart, or continuous, as in the peristaltic movements of the intestines. Also, that the contractility of these parts is preserved longer than that of the voluntary muscles, and that the effects of stimuli applied to the sympathetic nerve are of longer continuance than those of stimuli applied to the nerves of voluntary motion.

453. All the parts supplied with nerves from the sympathetic are, to a certain extent, independent of the brain and spinal marrow. Thus, the heart will continue to beat long after the division of its nerves, after severe injury of the brain and spinal cord, and even after its entire removal from the body. That the spinal cord, however, does influence the contractions of the heart has been proved experimentally; and that the brain affects them is shown by the familiar effect of mental emotions upon them. There is good reason also to believe that, as the parts supplied by the sympathetic are strongly affected by influences emanating from the brain and spinal cord, so the sympathetic is dependent for its supply of nervous power upon those centres.

454. The impressions made on the nervous fibres of the sympathetic are not usually conveyed to the brain; in other words, they are not of the nature of sensations; but violent causes of irritation may give rise to sensation in parts supplied by nerves from the sympathetic as well as in those supplied by cerebro-spinal nerves. When the cerebro-spinal nerves are the seat of the irritation, the painful sensations are usually experienced in the extreme parts of the organs affected: thus, we have itching of the nose and anus from the irritation of worms in the intestines, and pain and itching in the glans penis from disease of the kidneys and bladder. But irritation in the intestines or a disordered condition of the uterine functions, is a familiar cause of reflected sensations of a still more marked character, such as the acute pains in the muscles of the chest and abdomen occurring in hysterical females, accompanied by tenderness of the spine itself, and sometimes removed by remedies applied to that part.

455. The same irritation conveyed to the spinal marrow, and accompanied by tenderness there, may also be reflected through the nerves of voluntary motion, giving rise to a long train of spasmodic diseases: such as convulsions, chorea, and tetanus, in children from intestinal irritation; hysteria affecting the muscles of voluntary motion, but especially those of respiration, in adults from the same

cause; and vomiting and hiccup from irritation of the intestines, kidneys, or uterus.

456. The sympathetic nerve has been shown to preside over secretion and nutrition, and consequently over the functions of the parts concerned in these important processes: the capillary vessels, therefore, and the arterial system generally, fall under its influence. Of these, the organic functions of the sympathetic, and of the degree in which they are dependent upon the brain and spinal cord, less is known than of its other properties. There is reason, however, to believe that the sensations of cerebro-spinal nerves may be reflected from the spinal marrow on parts supplied by nerves from the sympathetic, as when syncope occurs from impressions on sentient nerves.

457. Instances of the reflected action of the organic nervous fibres of one part on those of another are very numerous. Thus inflammation of the testicle may be replaced by that of the parotid gland; erysipelatous inflammation of the skin by that of the brain; gouty inflammation of an extremity by a similar inflammation of an internal organ; rheumatism of a joint by that of the heart. So, also, with secretions; of which the best examples are afforded by the discharges from the skin, nostrils, and lungs, vicarious of, or supplemental to, the menstrual discharge.

458. In treating the phenomena of inflammation (§ 288, et seq.), it was shown that certain changes in the size of the small arteries, such as their enlargement in blushing, and their contraction from the emotion of fear, occur independently of increased action of the heart, and are strictly local phenomena. It was also shown that these changes in their calibre can be attributed to nothing else than a modification of their contractility, and this modification itself was attributed with equal reason to nervous influence.

459. This explanation would seem to apply with equal force to the larger arteries; and to account especially for the peculiar pulse which accompanies the first stage of severe febrile and inflammatory affections, and especially the indisposition which ushers in attacks of scarlet fever, erysipelas, and cynanche tonsillaris. The pulse here spoken of is distinct from that of health, and from that present in the after stages of these affections; it is present with the first feeling of indisposition, and continues till the characteristic marks of the disease have made their appearance. It is a frequent, full, weak, and compressible pulse, conveying to the finger the most distinct impression of a relaxed and flabby coat, and readily explained by the loss of contractility already spoken of.

460. On the strength of this symptom alone, the strong analogy of the small vessels may be extended to the larger arteries, and it may be confidently stated that there is one state of system, at least, in which the larger vessels undergo the same change as the smaller branches in inflammation. Is not this condition due to some change in the state

of the organic nerves supplying the coats of the blood-vessels? Does not that change consist in a withdrawal of the nervous influence from the vessels? And is not a diminution of nervous power the direct effect of the poisons which give rise to these diseases?

461. On the other hand, in certain cases, as in ague, may not this same state of the larger vessels follow upon an increased action of the vessels of the entire system; that is to say, upon a temporary increase of their contractility, just as in inflammation a dilated state of the capillary vessels follows upon the contraction produced by the application of a stimulus? In the general, as in the local affection, may we not have first the application of a stimulus, accompanied by an increase of nervous influence and consequent contraction of vessels, and then, as the necessary consequence, diminished nervous influence, and relaxation of vessels? This contracted state of the vessels is not overcome by a reaction in the centre of the circulating system, but yields to that diminished contractility which follows as certainly upon increased action as blunted sensibility upon over-exertion of the organs of sense, and fatigue upon long-continued or violent action of the muscles. This contracted state of the vessels is the *spasm* which plays so prominent a part in Cullen's theory of fever.

462. The sympathetic nerve, as the name implies, is assumed to be the organ of many of those combined sensations, motions, and secretions, which have received the name of *sympathies*. The discovery of the reflex system of nerves has traced some of these to a different source; but from whatever cause they arise, they are well deserving of attention.

463. The different parts of the same tissue are said to sympathise with each other: thus, in catarrh, inflammation is readily communicated from one part of the mucous membrane to another; inflammation of one serous membrane is sometimes followed by that of another, as peritonitis by pleuritis; gouty or rheumatic inflammation of the fibrous tissues of a joint by the same inflammation of the same tissue in the heart; inflammation of one tract of absorbent vessels by that of the glands through which they pass; and inflammation of the veins of the uterus by that of the same vessels in other parts of the body.

464. Different tissues are also said to sympathise with each other; as when inflammation commencing in the mucous membrane of the intestine extends to the muscular, and thence to the peritonæal, coat; or severe inflammation of the muscles of the side (Pleurodyne) to the pleura, or inflammatory affections of the skin to the mucous membranes. The viscera and their investments likewise sympathise with each other. Thus, disease of the substance of the lungs, heart, liver, kidney, uterus, ovaries, or testicle, is often accompanied by more or less acute inflammation of the serous membrane which covers them.

465. The sympathies of entire organs with each other are still more important. These may be classed as follows: 1. Sympathies between

organs having similar structure and function; as the salivary glands, the heart and blood-vessels, the stomach and intestines, the several parts of the nervous system. 2. Sympathies between organs of different texture, but belonging to the same system: as the chylopoietic, the uropoietic, the generative, the respiratory system, and the united respiratory and circulating system, viz., the lungs and heart. 3. Sympathies of the more important viscera with the central organs of the nervous system: as in the affection of the brain which follows intestinal irritation in children, and the affection of the stomach attending injuries of the brain. 4. Sympathies between organs not connected in any of the foregoing ways, and only to be explained on the principle of reflection: such as the parotid gland with the testicle; the mamma with the uterus; the larynx, and the glands which secrete the hair, with the parts of generation.

466. The several parts of the nervous system also sympathise with each other. Thus, the nerves of the surface and the central organs of the nervous system react upon each other; the affection of the central organs in fever causing the various conditions of the skin, and shocks applied to the skin exciting the brain and spinal cord. Thus, cold water poured on the head restores the brain exhausted by long-continued inflammation; and dashed in the face or thrown on the chest, removes an hysterical fit, excites the nervous centres in cases of narcotic poisoning, restores persons in the state of syncope, and is among the most efficacious remedies in asphyxia. In all these cases the central organs are roused into activity by the shock applied to the surface.

467. Sensitive nerves sympathise with sensitive, motor with motor, and sensitive and motor with each other. The optic, the olfactory, the auditory, and the ciliary nerves of the two sides are affected at the same time and in the same way, and an affection of one side often leads to a similar affection of the other: thus, inflammation of one eye is often followed by inflammation of the other; deafness of one ear by deafness of the other; an alteration in the size of one pupil by a similar alteration in the size of the other. This sympathy between the nerves of sensation supplying double organs extends also to nerves of different kinds and functions: thus, a strong light on the eye produces tickling in the nose; tickling the feet throws the whole body into convulsions; certain sounds put the teeth on edge; a tumour on a nerve may produce pain or spasms in parts of the body in no way connected with it. To phenomena of this kind the term *radiation of sensations* has been applied. Sympathies of motor nerves with each other occur in all associated movements. Those of motor with sensitive nerves belong to the class of excited or reflected motions.

468. The *excito-motory system.*—The nerves of this system are distinguished as incident and reflex; the incident nerves producing in the true spinal cord that condition which causes the reflex nerves to excite the muscles to contraction. The following plan will exhibit the extent and importance of this system:—

Incident motor branches.	*Reflex motor branches.*	*Excited actions.*
I. Trifacial, arising from		
a. The eye-lashes.	The trochlearis } oculi.	Protective and other movements of the eyes and eyelids.
b The alæ nasi.	The abducens } oculi.	
c. The nostrils.	Minor portion of the fifth.	Of the iris?
d. The fauces.	Orbicularis } from the	(Facial respiratory movements.) Sneezing, laughing, &c., &c.
e. The face.	Levator alæ nasi } facial.	
II. The Pneumo-gastric from		
a. The pharynx.	The pharyngeal.	Of the pharynx, { In ingestion of food, suction, deglutition, &c.
b. The larynx.	The laryngeal.	Larynx, { Closure of glottis, &c.
c. The bronchia.	The bronchial, &c.	Motions of the air-passages in respiration.
d. The cardia, kidney, and liver.	The œsophageal and cardiac.	Motion of the œsophagus and stomach in digestion.
III. The glosso-pharyngeal.	The myo-glossal.	Associated movements of tongue and pharynx.
IV. The posterior spinal from		
a. The general surface.	The spinal accessory.	Movements of the muscles of respiration.
b. The glans penis and clitoridis.	Diaphragmatic, Intercostal, Abdominal, } from the spinal.	Expulsion of fæces, urine, and semen, and of the fœtus in parturition.
c. The anus.	The sphincters, the expulsors, the ejaculators, the Fallopian tubes, the uterus, &c. } from the sacral.	Retentive movements of the sphincters—viz., of the cardia, of the valvula coli? of the sphincter ani, sphincter vesicæ, (neck of uterus?) and vesiculæ seminales?
d. The cervix vesicæ.		
e. The cervix uteri.		

Tone and irritability of the muscular system.

The first two columns of the foregoing table are taken, with slight alterations, from Marshall Hall's work "On the Diseases and Derangements of the Nervous System;" the third column is added from a subsequent table, showing the physiology of the true spinal system, with many transpositions and some additions, the excited actions being placed opposite to those divisions of the first two columns with which they have the most obvious connexion. The excited actions in the third column are not produced by irritation of the incident nerves of the first, but correspond more closely with the excited action of the reflex motor branches of the second column. Thus, the incident motor branches of the nostrils, when irritated, give rise not merely to the facial respiratory movements, but also throw the muscles of respiration into violent action. So likewise irritation of the bronchial incident nerves excites not merely the muscular fibres of

the bronchial tubes, but the muscles of expiration also to the act of coughing.

469. The following table presents the pathology of the true spinal system, according to Marshall Hall :—

PATHOLOGY OF THE TRUE SPINAL SYSTEM.

Diseases of the Incident Nerves.

I. Dental. Gastric. Intestinal.	Irritation in Infants.	1. Crowing inspiration. 2. Strabismus, spasm of the fingers and toes, stranguary, tenesmus, &c. 3. Convulsions. 4. Paralysis.
II. Gastric. Intestinal. Uterine.	Irritation in Adults.	1. Hysteria. 2. Asthma, 3. Vomiting, hiccup, &c. 4. Epilepsy. 5. Puerperal convulsions, &c.

III. Traumatic tetanus, hydrophobia, &c.

Diseases of the Reflex or Motor Nerves.

I. Spasm.
- a. Spasmodic tic.
- b. Torticollis.
- c. Contracted limbs, &c.

II. Paralysis.

Diseases of the Spinal Marrow itself.

I. Inflammation and other diseases.
II. Diseases of the vertebræ and membranes.
III. Counter Pressure, &c., in diseases within the cranium.
IV. Centric epilepsy, tetanus, &c.
V. Convulsions from loss of blood, &c.

470. The condition of the nervous system and that of other functions of the body reciprocally affect each other; but this mutual dependence is so strikingly displayed in the case of the circulation and the nervous centres, as to merit a separate consideration in this place.

471. The effect of the emotions and passions, and of all violent exertions of the body, on the heart, is a matter of daily observation; and so surely does the circulation participate in every change of the nervous system that it becomes the best test of the degree and amount of that change. Every violent exertion of different muscles, and every long-continued exercise of the same muscles, strongly excites the pulse; and rest not only restores it to the frequency which it had before the effort, but for a time reduces it below it. The various causes of excitement to which the body is exposed during its waking hours affect the circulation in the same way. It is in consequence of the fatigue produced by these causes that the pulse falls towards evening, and regains its frequency when the body has been refreshed by sleep. Precisely the same effects are produced by disease. In febrile affections, for instance, the pulse during the height of the disorder is much more frequent than in health, but as soon as the disease has passed away, the pulse falls many beats below its natural frequency, to regain that frequency again as health and strength return.

472. Another remarkable fact established by careful observation of the pulse is, that the body is much more affected by all causes of excitement when it is in full possession of its strength, than when it is exhausted by fatigue. Thus all stimuli—muscular exertion, food, drink, and even mental application—produce a much greater effect on the circulation in the morning than at night, and not only a greater effect, but one of much longer continuance.

473. But there are states of debility in which the heart's action is more frequent than in health. This occurs in a more advanced stage of convalescence, when the patient begins to recover his strength, and also in the decline of febrile affections, so long as any degree of fever continues. A greater degree of debility in the absence of actual disease is characterised by a very small and very frequent pulse; but such debility is rarely met with except as the consequence of diminution in the quantity of the circulating fluid, whether from excessive loss of blood or from increased discharges.

474. When exhaustion of the nervous power is accompanied by local disease, whether functional or structural, that state of system exists to which the name of *irritation* is given. It occurs in cases of slow convalescence from fever, in which some local affection has supervened; as an immediate consequence of severe injuries in subjects debilitated by previous disease or bad habits of life; and as a more remote consequence in sound constitutions. In these latter cases, the injury itself produces the same nervous exhaustion which bad habits or previous disease had occasioned in the former.

475. Another example of the action of the nervous system on the circulation is afforded by that temporary arrest of the heart's action known as *syncope*, or fainting. This state may be brought about by any violent shock sustained by the nervous centres, originating from without, as in accidents, or within the brain itself, in the shape of violent emotions. Sometimes the heart is paralysed by the shock, and death is the result.

476. There is still one other mode in which the nervous centres act upon the circulation. When blood or serum is effused upon the brain, the heart is remotely affected, and the same result follows a similar injury to the upper portion of the spinal cord. In these cases the heart may beat less frequently than in health.

477. The effect produced upon the nervous centres by changes in the circulation is more important even than those which the circulation suffers from alterations in the state of the nervous system. The exhaustion which follows on strong nervous excitement has its counterpart in that produced by loss of blood. The sudden loss of a large quantity of blood produces syncope or death, partly by depriving the heart of its due amount of stimulus, and partly by paralysing the nervous centres.

478. In healthy persons loss of blood occasions a degree of debility

proportioned to the quantity; but when it occurs in persons afflicted with local disease, or of a broken constitution, the debility is accompanied by nervous excitement, and *irritation* is the consequence. The same effect follows when the quantity of the circulating fluid is diminished by profuse discharges, such as leucorrhœa or diarrhœa. An excessive and continued drain of natural secretions, as in menorrhagia, and in prolonged suckling, leads to the same result. But the puerperal state, combining, as it does, nervous exhaustion, loss of blood, a local affection, and a sudden change of the equilibrium of the fluids, presents the most vivid picture of that state to which the name of irritation has been given.

479. In this condition of irritation, as in that originating in the nervous centres themselves, the circulation is affected, and we have the frequent and quick pulse easily excited by mental emotion or by strong and sudden impressions on the organs of sense. The functions of the brain also suffer; and we have, according to the degree of irritation, mental excitement, delirium, or mania. The nervous influence conveyed to the muscular system betrays the same derangement under the forms of restlessness, jactitation, convulsions, and spasms in the voluntary muscles, and frequent or irregular breathing, laughing, crying, sighing, sobbing, and yawning, in the muscles of respiration. The nerves of sensation participate in the general derangement of the nervous system, and we have intolerance of light and sound, an excessive sensibility of surface, and acute reflected pains in the walls of the chest and abdomen. The stomach likewise shows its sympathy with the nervous centres by nausea, vomiting, or hiccup.

480. Such are some of the phenomena of the state of irritation—a state which, whether it originate in the nervous system, or in the circulation, displays nearly the same character, and requires the same treatment. It is aggravated by depletion, and relieved by those remedies which impart strength whilst they soothe excitement. A combination of narcotics and tonics, or, if the debility is extreme and the nervous symptoms urgent, of narcotics and stimulants, is the remedy indicated.

481. The influence of the nervous system over muscular movements has already been alluded to, and two classes of movements have been described, the involuntary and the voluntary; the former excited by certain changes in the condition of the incident or excitor nerves giving rise to corresponding changes in the reflex or motor nerves, and the latter by the will. In health these two sets of muscles execute their appropriate movements; in disease, or in peculiar states of system, the one takes on the character of the other, the involuntary muscles obeying voluntary impulses, and the voluntary muscles performing involuntary contractions.

482. A well-authenticated example of involuntary muscle being subject to the influence of the will occurred in the case of Colonel Townsend, who possessed the extraordinary faculty of stopping the

beat of his heart at will; and the same power seems to have existed in one or two other instances.

483. Some of the most striking examples of involuntary actions of voluntary muscles observed in disease are, chorea, hysteria, epilepsy, catalepsy, convulsions, tetanus, hydrophobia. Of these diseases, some depend on a direct influence transmitted from the nervous centres, but the majority are examples of a reflex action.

484. When the contractions continue in the same muscles for a certain space of time, producing a fixed and rigid state of the parts affected, they are said to be *tonic;* when the muscles are alternately contracted and relaxed, they are called *clonic*. Tetanus, hydrophobia, and catalepsy are examples of *tonic* spasm; chorea, hysteria, and epilepsy are forms of *clonic* spasm; convulsions are sometimes of one kind and sometimes of the other.

485. In chorea and hysteria, voluntary and involuntary impulses are strangely blended; but the degree of control which the will exercises is widely different in the two cases. When a patient affected with chorea wills a movement, the involuntary action, mixing with the voluntary effort, causes grotesque distortions, and attempts at restraint only increase the action of the muscles; but the movements of the hysteric patient are less grotesque, though more violent, and can often be restrained by a strong effort of the will.

486. Convulsions afford an example of unmixed involuntary contraction. They are commonly a form of reflex action; but when they follow the loss of blood, they probably arise from the sudden removal of that nervous influence which maintains the tone and the equilibrium of the muscles. Hence the flexors, which are the stronger muscles, contract, and the extensors, being put on the stretch, are in their turn brought into action, and thus an alternate or clonic contraction of the two sets of muscles takes place; but as there is a balance of strength in favour of the flexor muscles, they at length overpower the extensors, and if death ensue, the fingers and toes are found flexed.

487. Convulsions, therefore, are often the last movements of a living body. They are also the most efficient cause of restoration from syncope; for when the circulation has nearly ceased, and the heart does not receive blood enough to excite it to action, the contraction of the muscles of the limbs forces the blood of the veins towards the heart, and thus tends to re-establish the circulation. The trembling of the limbs from cold, which is a low degree of convulsion, has the same beneficial effect in restoring the circulation of the blood.

488. The nerves of sensation, like those of voluntary motion, are subject to various derangements. Sensation may be lost (anæsthesia), or exalted (hyperæsthesia), or perverted (dysæsthesia). The loss of sensation which sometimes accompanies paralysis of the voluntary muscles is an example of anæsthesia affecting the nerves of touch; and amaurosis, of anæsthesia of the optic nerve. Intolerance of light and

sound, and violent hunger and thirst, are examples of hyperæsthesia. The strange pains and anomalous sensations of hysteria and hypochondriasis, are instances of dysæsthesia. In some hysteric females there appears to be diminished sensibility of the nerves of touch, with increased sensibility of other nerves, the sensibility appearing to be withdrawn from the one to be concentrated in the other. Hence some of the most remarkable phenomena of nervous affections, and of that state induced by the manipulations of the magnetiser.

489. There still remain to be considered two functions closely dependent upon the nerves, though connected more or less with the changes which are constantly taking place in the fluids and textures of the frame:—the generation of heat and electricity.

490.—*Animal heat.*—The cause of animal heat is still a subject of controversy; but the experiments of Depretz and Dulong, as recently interpreted by Liebig, have rendered it in the highest degree probable that the production of animal heat is entirely due to the combination of the carbon and hydrogen of the blood with the oxygen of the air. This combination, which was formerly supposed to take place in the lungs, is now believed to occur in the minute capillaries of every part of the system by means of the oxygen absorbed in interchange for the carbonic acid expelled from the lungs. It has also been shown experimentally that the nerves exercise an important influence upon the temperature of the body. Though the precise effect which each of these causes has in the production of animal heat has not been determined, observation has shown that its amount varies greatly in different states of the system.

491. The temperature of those internal parts of the body which are most accessible—viz., the mouth and rectum—is about 97½° or 98½° Fahr. A difference, however, has been observed to exist in parts near to and remote from the centre of the circulation; thus, Dr. J. Davy observed, that the temperature of the axilla being 98° F., that of the loins was 96½°, that of the thigh 94°, that of the leg 93° to 91°, and that of the sole of the foot 90°. The temperature of the blood was about 101°.

492. In disease, remarkable deviations from the standard temperature have been observed, both in excess and in defect. The temperature of inflamed parts has been found as high as 105° to 107°, and that of the whole surface has reached the same degree in some cases of fever, and risen still higher (to 112°) in scarlatina. On the other hand, in cases of morbus cæruleus and in the cholera, the temperature has been observed as low as 77½° or 77°.

493. In most cases of disease, the increase and decrease of temperature bear a pretty exact proportion to the rapidity or slowness of the circulation; but remarkable exceptions to this rule have been observed. Thus, Dr. Hastings, in his work on inflammation, states, that in several cases of fever the pulse has been remarkably infrequent, whilst the temperature has been very high; the pulse, for instance, being 45

when the temperature of the body was 105°. In cases of hydrocephalus the same observer has counted a pulse of 60 or 70, with a temperature of 100°.

494. *Electricity.*—The facts ascertained with regard to free electricity in man are the following:—As a general rule the electricity is positive, but in the female more frequently negative than in the male; it is more abundant in persons of a sanguine temperament than in the lymphatic; greater in the evening than in the morning; greater when the temperature of the body is high than when it is low; it is increased by spirituous liquors, and reduced to zero in rheumatic affections. The free electricity of the body is generally of very feeble intensity; but in peculiar states of system the body has given out sparks in great abundance.

5. MENTAL PHYSIOLOGY AND PATHOLOGY.

495. Some of the most difficult and responsible duties which the physician is called upon to perform have relation to the mind. Disorders of the mind, more or less permanent, and more or less dependent upon bodily diseases, are of frequent occurrence in the practice of all physicians; and mental diseases engage the exclusive attention of a not inconsiderable body of medical practitioners. Hence the physiology and pathology of the mind have claims on the attention of the medical man not inferior to those advanced by the physiology and pathology of the material structures.

496. Indeed the brain, the material instrument of the mind, formed of the same or similar elements with other structures, nourished in the same way, deriving its supply of blood from the same centre, and through the same intricate network of arteries and veins, is affected by every change in the composition of the blood, and by every derangement in the balance of the circulation; and is subject to all the functional and structural diseases to which the other organs of the body are liable.

497. The brain, and the entire nervous system, as parts of the material structure of the body, must also be subject to all those influences, external and internal, which have been already examined (§ 3 to 82). Between brain and brain, as between body and body, it is but reasonable to expect that there will be important original and acquired differences; original differences in size, shape, and consistency, and others more difficult to define, resulting from temperament, diathesis, and idiosyncracy, from age, sex, and race; and acquired differences, due to climate, residence in town or country, occupation, and habits of life.

498. Many of these physical agents act upon the brain and nervous system more promptly and forcibly than on any other part of the body. This is especially true of excitement, fatigue, dissipation, intemperance, and inaction. Many poisonous agents, too, take effect chiefly upon

the brain and nervous system, and prove fatal by the disturbance in their functions to which they give rise.

499. Again, the brain, as the mind's material instrument, is subject to inaction, to wholesome exercise, or to over exertion, according as education is neglected or enforced in early life, and in proportion to the necessity which exists for self-culture and labour in after life.

500. If, then, we consider the brain in this twofold point of view (as a constituent part of the body, subject to all the influences by which it is affected, and as the material organ of the mind developed by mental exercise), we shall be prepared to find the differences between mind and mind, whether in health or disease, equalling and even surpassing those already pointed out (§ 84) as existing between body and body.

501. The brain, as has been already stated (§ 426), viewed as the organ of the mind, is the centre both of intelligence and of action. To it all sensations are referred, and from it all volitions emanate. It performs these functions subject to the condition that the nervous communication in both directions (inwards from the organ of sense, and outwards to the muscles) shall be unbroken.

502. Each organ of sense consists of three parts: 1, an external apparatus on which the impression of the object is made by contact, as in the senses of touch, taste, and smell, or by intermediate undulations or vibrations, as in the senses of sight and hearing; 2, a nerve transmitting this impression to the brain; and, 3, a portion of the brain itself set apart, as is probable, for taking cognizance of the impression thus produced and conveyed; and, as in the case of the two eyes, combining two distinct impressions into a single sensation. On the other hand, each distinct apparatus of volition, as the organs of speech and the organs of locomotion, consist, in all probability, of similar constituent parts: 1, of a portion of brain in which the act of volition originates; 2, of a nerve or nerves by which the mandate is conveyed; and, 3, of a collection of muscles by which the mandate thus originated and thus transmitted, is obeyed.

503. The parts of the brain to which the several sensations are conveyed, and from which the mandates of the will issue, are subject to original deficiency no less than to the disabling effects of disease. Some persons, for instance, are unable to distinguish colours, others are equally incapable of recognising musical notes and intervals; and, on the other hand, a few cases are recorded of persons with perfect hearing and well-formed organs of speech, who have never been able to articulate. Blindness from disease of the parts of the brain to which the optic nerves join themselves, and loss of speech from apoplexy affecting the base of the brain near the origin of the lingual nerves, are familiar examples of the disabling consequences of disease.

504. In tracing the path of sensations from without to within—

from the impression on the organ of sense to the part of the brain which takes cognizance of it—we come in contact, so to speak, with two important operations, or faculties of the mind, *volition* and *memory*.

505. Volition plays a most important part not merely in directing all those muscular movements by which we make provision for our subsistence and communicate with our fellows, but also in perfecting the work of sensation begun by the organs of sense. Without that act of volition, which, when it is brought to bear upon our sensations constitutes *attention*, no external object could be distinctly perceived, nor could it be afterwards recollected. On the other hand, without that power of reproducing sensations which constitutes *memory*, the more complicated acts of volition could have no existence. Hence, volition and memory would appear to be closely linked together, to have their material instruments in parts of the brain nearly connected with each other, and to be subject to be simultaneously impaired by disease. But the will and the memory are not limited in their operations to muscular movements on the one hand, and bodily sensations on the other; for the will also directs and controls the operations of the mind, and the memory stores up and reproduces not sensations only, but trains of thought, processes of reasoning, complicated transactions, and the workings of emotion and passion.

506. It has just been stated that impressions made upon the senses, in order that the mind may take cognizance of them, must be accompanied by an act of volition known as attention. Now, whenever an object presented to the senses is thus attended to, it is said to be perceived; in other words, sensation is converted into *perception*.

507. Perceptions vary greatly in intensity in different persons; also in the same person at different periods of life, and in different states of body; and there is the same difference in regard to that reproduction of perceptions which constitutes memory or recollection. In some persons, perceptions are reproduced with extraordinary quickness, vividness, and fidelity, while in others they can scarcely be reproduced at all; and one of the principal features of the mind in old age, and of the unsoundness of mind peculiar to the aged, consists in the obtuseness of the perceptions, and the extraordinary difficulty with which they are recalled or reproduced. Perception and memory, indeed, bear a pretty exact relation the one to the other. Those objects which were best perceived are best remembered, and those which scarcely made any impression when presented to the senses are not reproduced at all, or with great indistinctness.

508. In a few rarely-gifted individuals, perceptions are reproduced with such vividness and fidelity that the objects formerly perceived, are, so to speak, painted upon the retina, or transferred to the other organs of sense, by an effort from within. This perfect operation of memory is sometimes attributed to the imagination, and is termed *conception*. This power of depicting objects on the retina by the

force of thought, belonged to the poet Goethe during the whole of his life; and the Editor of this work had the same faculty during his childhood.

509. When this same transference of thought to the organ of sense is involuntary, it constitutes *illusion*, of which the most familiar form is *spectral illusion*—a subject of great importance in relation to certain forms of unsound mind.

510. Objects of sense, then, make impressions of varying intensity according to the degree of attention bestowed upon them. When the mind is preoccupied by a train of thought, objects presented to the senses make little or no impression, and are neither observed nor remembered; and this preoccupation of the mind, which renders the sane man blind and deaf to the things going on about him, doubtless occurs in certain forms of unsound mind, and accounts for a part of their phenomena. This preoccupation carried to excess constitutes *absence of mind*, and explains the eccentric acts of absent men, and some of the unaccountable proceedings of madmen.

511. By that effort of the will, then, to which we give the name of *attention*, we are able to perceive objects with more distinctness, and to reproduce perceptions with more facility. Now, sensations do not come into the mind singly, but in groups; and our knowledge and experience of the objects which surround us is compounded of many sensations. Thus, an orange produces a number of different sensations at the same time—a sensation of size, of shape, of colour, of weight, of odour, of taste; and it is by an effort of the *will* alone, in other words, by an effort of *attention*, that we can single out one of these several sensations of which the word orange has been made the representative, and make it a separate subject of contemplation. This separation of one sensation from another is called *abstraction*, and the exercise of the mind upon sensations thus separated is called *abstract reasoning*.

512. The necessity of such a power of abstraction arises out of the existence of another and directly opposite faculty, or mode of action, of the mind, namely, the faculty of *association*. As *attention* separates, and so to speak, *isolates* sensations which are commonly combined, so does *association* combine, and cause to reappear together, or in rapid succession, those sensations or ideas which either took place simultaneously or successively, or which have in any manner been previously conjoined.

513. This tendency of sensations and ideas to appear in the connection or succession in which they had previously entered the mind, can be broken through only by an effort of volition; but when such effort of volition has repeatedly placed in combination or succession a number of sensations or ideas, this very combination or succession, though originally forced and voluntary, soon falls under the influence of the law of *association*, and a fresh effort of the will is necessary to separate and disarrange them.

514. That repetition of sensations, thoughts, or movements, at first painful and voluntary, which ultimately transfers them from the dominion of attention to that of association, is called *habit*. When this transference is complete a man is said to become the slave of association or of habit.

515. By a faculty allied to, if not identical with, this of association, the mind also passes from one thought or recollection of an agreeable or of a painful character to another of the same complexion.

516. The attention alternately, or successively, directed to different sensations or ideas leads to a further act of the mind for which a particular mental faculty, known as the faculty of *comparison*, is supposed to be required. This faculty, in a being already supposed to be endowed with free will, implies a power of choice.

517. This faculty of comparison is essential to the acquisition of knowledge, as well as to the regulation of our actions. The impressions made upon one sense must be compared with those made upon another; the eye must correct the ear, and the sense of touch the eye, in order that we may form distinct and precise notions of the properties of external objects. The sensations or ideas reproduced by the memory must also be contrasted with those produced by objects present to the senses, in order that we may not confound the creations of our own minds with realities. In persons of unsound mind, this power of comparison is lost, and the unfounded thoughts which spring up in the mind are taken for realities.

518. Without the exercise of this faculty of comparison it would not be possible to make a single step in art or science; and orderly arrangement and scientific classification are entirely dependent upon it.

519. The objects grouped together by the aid of this faculty are either the same or similar; that is to say, all their properties agree or only some of them. Hence, we are able to say of any one object contained in a group or class what we are able to say of every other object, either in respect of all its properties, or of that one property which formed the basis of the classification. Now this twofold process of constructing groups or classes out of individuals, and then affirming of the individuals that they possess the property or properties which first led to their being thrown into groups, is the whole secret of our knowledge—of science in its highest and in its lowest forms.

520. When the objects thus grouped together are simple in themselves and exactly alike, and when the words we use to describe or define them can be understood only in one sense, our knowledge becomes absolutely certain: but when the objects are complex and only similar, and our words less precise, we are obliged to content ourselves with knowledge of a less definite and exact character. Now, there is only one class of objects to which the first part of this description is ap-

plicable, and these objects are mere *abstractions;* that is to say, they consist of the universal relations, as distinct from the special properties of matter, such as space, time, number, position, direction; with regard to which we can make certain assertions that can neither be doubted nor denied, and lay down certain definitions that cannot be misunderstood: and *Reason*, availing herself of these *assertions* or *axioms*, as they are called, and of these plain definitions, and making use of a language at once condensed and intelligible, has built up that vast and wonderful fabric of abstract knowledge known as the *mathematics*.

521. Every act of comparison between one object and another, or between one object and the group of objects to which it belongs, results in an inference expressed or understood; and these acts of comparison, taken with the inference drawn from them, constitute a process of *reasoning*. So that the *reason* may be defined as the faculty by which we draw inferences from comparisons.

522. Now every process of reasoning, however complicated it may seem to be, consists of two assertions, containing the elements of a comparison, and an inference. The first assertion is, that a *group* of objects possesses this or that *property* or *properties;* the second, that an *individual* object belongs to that group, and the inference is, that, as a necessary and inevitable consequence, this individual object possesses the properties of the group to which it is asserted to belong. These two assertions are technically called *premisses* (major and minor), and these, with the conclusion or inference, constitute what logicians call a *syllogism*.

523. It is of the first importance to understand that when fallacies creep into a process of reasoning, they are to be found in the premisses, from which the inference, or conclusion, is a necessary consequence; and this observation applies to the operations of the unsound, as well as of the sound mind; for though there are several forms of unsound mind in which the power of making comparisons and of drawing inferences is lost or wanting, there are others in which the power of drawing correct inferences is retained; the defective reasoning consisting in erroneous premisses dictated by distorted perceptions, a perverted imagination, or over-excited feelings.

524. The correctness of this explanation will be readily recognised in those cases of monomania, or partial intellectual mania, in which the patient believes that his body has been changed from flesh and blood into some other material, such as glass or butter. Such a patient will not merely reason correctly on this false and almost incredible assumption, but he will shape some at least of his actions in obedience to the inference correctly drawn from the false premiss.

525. There are, however, as has been already stated, other forms of mental unsoundness in which the reasoning faculty is so impaired, that even the formation of a simple syllogism is impossible; in which the reason, in common with the other faculties, is in a state of complete

decay. This happens in extreme cases of *dementia* and in the *dementia* of old age. Again, there are cases of *idiocy*, or of extreme *imbecility*, in which the reasoning faculty has never been developed, even to the extent of comprehending or employing the simplest and easiest arguments. There is also another condition of the unsound mind, characterised by complete *incoherence*, when all the faculties are in a state of intense excitement and hurry, so that there is not, so to speak, breathing-time for the deliberate exercise of thought or reflection.

526. Some account has now been given of those faculties of the mind by which we obtain knowledge. Mention has been made of the *senses* as the prime source of all knowledge; of *sensations*, as the impress of outward objects on the sensorium; of *perceptions*, as sensations strengthened and recognised by attention; of *conception*, as sensations producible at will, without a corresponding outward object, but simply by the intense operation of the mind itself; of *memory*, as the faculty by which sensations are reproduced; of *attention*, as that by which sensations are strengthened, separated, or arbitrarily combined; of *association*, as the faculty by which sensations are linked together in their original or acquired relations; of *comparison*, as the faculty by which sensations or ideas are contrasted; and, lastly, of *reason*, as the faculty by which conclusions or inferences are drawn from premisses.

527. By the aid of these faculties alone we might have accumulated knowledge, and created arts and sciences; we might have obtained much acquaintance with the properties of matter, and some mastery over it; we might have made some advances in civilization; but without that inventive, suggestive, anticipating, exaggerating faculty to which we give the name of *imagination* or *fancy*, hypothesis, theory, poetry, and high art would have been impossible, and several forms of unsound intellect unknown.

528. The province of this faculty of the mind would seem to be to select and arrange, in new and arbitrary combinations, forms, colours, sounds, descriptive words and phrases, and even the simplest and most abstract facts of science, with a view to please, persuade, and amuse; or, to speak more generally, to excite in the minds of others, by every kind of skilful combination and contrast, emotions pleasurable or painful. The most arbitrary of these combinations, when relating to matters of science, are termed hypotheses; when employed upon trivial subjects, and directed to mere amusement, they are known as wit and humour. For practical purposes it may be sufficient to state that men are said to exercise the imagination, or fancy, whenever, without the intention to deceive, they make assertions incapable of proof, or unsupported by the concurrent testimony of other persons having the same opportunities of observation or experience with themselves.

529. Of the intellectual faculties, the imagination is that which has the strongest affinity with the emotions and passions, for its operations, like theirs, are attended by excitement. It seems, indeed, to hold a middle place between the intellect on the one hand, and the passions

on the other; adding vigour and originality to thought, whilst it lends attraction to objects of desire, and gives intensity to every effort by which they can be compassed.

530. The powers or faculties of sensation, perception, conception, comparison, reasoning, and imagination, make up the sum of what are commonly known as the intellectual faculties. They may all be said to be dependent, primarily, on the senses, and to subserve the work of contemplation; but the faculties now to be considered lead directly to action. They are known as *passions* and *emotions*, as active and passive emotions, or as propensities and sentiments.

531. Between the passions and the emotions it is not easy to draw an exact line of demarcation; but it is usual to characterise *benevolence*, *veneration*, *hope*, *fear*, *grief*, *remorse*, as emotions; *lust*, *anger*, *ambition*, *vanity*, as passions. Although there is undoubtedly a distinction between them, yet they resemble each other in this—that they arise in the mind spontaneously whenever the object calculated to excite them is presented to it, whether from without by the *senses*, or from within by the *memory*. They do not arise from any process of *reasoning*, or from any exercise of comparison, but resemble instincts in the rapidity with which they spring up, the certainty with which they are directed to their objects, and the wonderful promptitude with which they act. When very strongly developed, or excited, they act even in persons of sound mind with such promptitude as to forestall the exercise of reason. Indeed *reason*, in the sense of the *reasoning faculty*, is in the very nature of things too slow in its movements to form an efficient check to the passions, or a safe guide to the emotions. To check the one and to regulate the other is the work of *conscience*, an original and innate faculty, but one in some degree formed and moulded by instruction communicated to us in early life, and modified by the habits of society. Acting, as it does, with all the quickness and precision of an instinct, it is the only faculty prepared to offer effectual resistance to the feelings and passions, simply because it is the only faculty which acts as promptly as themselves.

532. As the intellectual faculties exist both originally, and as a consequence of habit and culture, in very different proportions in different persons, so also do the *emotions* and *passions*; and just as education gives acuteness to the perceptive and reasoning faculties, indulgence gives power to the emotions and passions, and restraint, on grounds of reason and right, supremacy to the conscience.

533. This sketch of the mind in its sound state would be incomplete if some allusion were not made to those first truths in which all sane men believe, without being led to that belief by any operations of the intellect of which they are conscious. Such are a belief in our own personal identity; in the real existence of objects of sense; in the uniformity of the operations of nature; and in the necessary connection of cause and effect.

534. Having thus, with the brevity imposed by the narrow limits

of this work, considered the faculties by means of which we gain and impart knowledge, the emotions and passions by which we are moved to action, the conscience by which we are restrained, and the first truths without a belief in which life itself could scarcely be preserved; our attention will naturally be directed, in the next place, to certain conditions of the senses and of the mind which tend to enlarge our knowledge of mental phenomena, and while they do not constitute mental unsoundness, often enter into that state as constituent parts, and serve to throw valuable light upon it.

535. The first of these conditions is *illusion* of the senses, and especially *spectral illusions*.

536. All the senses without exception may become the seats of abnormal impressions—the eye of bright or dark spots, and circles of colours; the ear of humming, hissing, or blowing sounds, or distinct musical notes; the taste, of bitter or salt savours; the sense of smell, of unreal odours; and the sense of touch, of a feeling of local pressure, of heat, or of cold, and of sensations of creeping, itching, pricking, and tingling. These false sensations are due to changes in the circulation through the brain, or through the nerve of sense.

537. Objects of sense are also apt to be exaggerated, or the reverse, by peculiar states of the organs of sense, or of the brain; and especially during slight febrile attacks, or in the early stage of convalescence from febrile disorders. Visible objects, for instance, are either magnified to enormous dimensions, or diminished to the smallest possible size; and sounds seem lower or louder than they really are.

538. Similar exaggerations of objects of sense often take place under the influence of strong mental emotion, especially fear. A good example of this sort is supplied by the case of a thief to whom, in common with other suspected persons, a stick of a certain length was given, with the assurance that the stick of the thief would grow by supernatural power. The culprit, imagining that his stick had actually increased in length, broke a piece off, and was thus detected. A similar anecdote is told of a farmer, who detected depredations on his corn-bin, by calling his men together, and making them mix up a quantity of feathers in a sieve, assuring them that the feathers would infallibly stick to the hair of the thief. After a short time, one of the men raised his hand repeatedly to his head, and thus betrayed himself. In the first of these cases the sense of sight was affected, in the second the sense of touch.

539. Another affection of the organs of sense allied to true spectral illusions, consists in an extraordinary permanence of impressions made upon the senses by external objects. One instance in which the impressions made by the notes of a bugle remained on the ear for nine months is mentioned by Abercrombie; and a still more remarkable case, in which the spectrum of the sun remained on the retina for ten years, is cited by Feuchtersleben from Boyle.

540. A remarkable reproduction, after a short interval, of impressions made upon the senses, occurred in the person of Dr. Ferriar, who, when about the age of fourteen, after viewing any interesting scene during the day, on entering a dark room, had the whole reproduced with great fidelity for some minutes. This reproduction of sensations seems to have been involuntary. On the other hand, Goethe had the power of producing pictures at will, but could not dismiss them when he desired to do so.

541. From pictures on the retina, conjured up by an effort of the will, without any corresponding object present to the eye, and from similar pictures produced without an effort of the will in consequence of vivid impressions previously made on the organ of vision, the transition is easy and natural to illusions of the senses, and especially of the sense of sight, over which the individual affected by them has no control, and which have also no relation to objects previously perceived. Such illusions are of very special interest, inasmuch as they occur in many cases of unsound mind, though they are quite compatible with the most perfect sanity.

542. Several interesting cases of ocular spectra, so closely resembling real objects as to be distinguished only by the most careful exercise of comparison and judgment, are related by Sir David Brewster, in his work on Natural Magic, and by Sir Walter Scott, in his "Demonology and Witchcraft." That of Nicolai, the Berlin bookseller, is not the least remarkable. In the case of a lady, whom Sir David Brewster designates as Mrs. A——, the sense of hearing was first affected, her husband seeming to speak to her, though he was not near her, and this was repeated several times in the course of her malady. The sense of sight was next the subject of similar impositions. At one time, she saw the spectre of her husband; at another, that of a near relation enveloped in grave-clothes; at a third, that of a deceased friend; at another time, a spectral cat. But in all these cases, whether the ear or the eye was the subject of the illusion, the mind was fully aware of the real seat and nature of the deception.

543. The woman in the red cloak, seen by a patient of Mr. Abernethy, the ghastly spectre which appeared to Lord Castlereagh at night, and the figurantés in green who persecuted Sir Walter Scott's young man of fortune till they drove him out of England, all belong to this class.

544. Many remarkable men have been subject to these false impressions on the senses. The list comprises the names of Luther, Oliver Cromwell, Pascal, Goethe, Cellini, and Schwedenborg. The student worn out by application, the religious enthusiast exhausted by watching and fasting, Silvio Pellico in his solitary confinement, the sailors of the 'Medusa' suffering from mingled privation and excitement, the drunkard and the opium-eater, *and persons under* the influence of poisons of the *narcotico-acrid class, have all* afforded examples of spectral *illusion.*

545. Spectral illusions, too, are not uncommon in females at or about the change of life, when suffering from the group of nervous symptoms so common at that period; and in the disease known as *mimosis inquieta*, by whatever cause produced.

546. Lastly, spectral illusions are of common occurrence in dreams, in delirium, and in madness; so common are they in this last condition, that Esquirol estimates at 80 per cent. the proportion of persons afflicted with mental unsoundness who are subject to illusions of one or other of the senses.

547. As spectral and other illusions of the senses may occur both in persons of sound and of unsound mind, it is important to distinguish between them. The difference consists in this, that the madman believes in the reality of these false perceptions, while the sane man corrects them more or less promptly by the use of the other senses, or by some other effort of comparison. There are, indeed, two ways in which these false perceptions may be corrected:—by the exercise of other senses, as in a case mentioned by Abercrombie, in which the true nature of a spectral illusion was discovered, by observing that the lock of a door was seen through the spectral figure; and by a comparison with the perceptions of other persons, as in Mr. Abernethy's case of the woman in red. The man of unsound mind neglects both these means of undeceiving himself, or is unable to use them; or, if he entertain any doubt at all, he has some false reason to assign to himself in favour of the reality of the supposed object of sense.

548. Spectral illusions can sometimes be distinctly traced to thoughts or wishes which have previously passed through the mind. A patient of the Editor, in the course of his recovery from a slight attack of fever, preceded by a severe family affliction, slept during the heat of summer in a room commanding a view of a large pond. One day he was seized with a great desire to bathe, and on the evening of that day a spectre presented itself at his bed-side, drew aside the curtains, and invited him to the water. This fact is rendered the more interesting by the circumstance, that though the patient's mind was so far recovered as to allow of his calmly reasoning upon the occurrence, his mood of mind and expression of countenance changed in an instant, and he affirmed with great energy his intention to accompany the spectre should it appear to him again. A similar illustration of the occasional dependence of spectral illusions on the natural workings of the mind was afforded by an old lady, also a patient of the Editor, who on two occasions, under the apprehension of the fatal issue of severe attacks of illness in her children, saw the whole paraphernalia of a funeral cross her room.

549. In some forms of unsound mind, especially in that form known as *incoherence*, there is reason to believe that illusions of the several organs of sense succeed each other with a rapidity only to be compared with the hurry of the thoughts to which the patient gives verbal utterance.

550. There are one or two considerations of the greatest interest and practical importance connected with the subject of spectral illusions.—1. They are independent of the will, for they form the very staple of dreams in which the will is suspended, and they appear to the waking man not merely without the will but in spite of it. 2. They are sometimes the false impressions of dreams continued for some time afterwards in the waking state. 3. They are not merely vivid reproductions of former impressions on the senses, but new combinations or creations. 4. They often occur in persons in no way remarkable for talent or imagination. 5. They are often dependent upon such mere changes in the balance of the circulation through the brain as occur in sleep, or in states of system deserving of the name rather of disordered circulation than disease, as in the case of Nicolai, in whom they were clearly traceable to the suppression of an hæmorrhoidal discharge, and the immediate excitement of a fit of passion. 6. They are not, as it would not be unnatural to suppose them to be, mere reflex impressions on the retina, originating in the part of the brain in which perception takes place, and conveyed back through the optic nerve; for they have been shown to be present in cases in which the optic nerve is so injured or diseased as to be unable to perform its proper function.

551. The bearing of these facts upon the phenomena of unsound mind is obvious. If a change in the state of that part of the brain by which impressions on the senses are perceived, or of the whole brain, can conjure up illusions of the senses so like real things as to require a strong effort of the sound mind to distinguish them, it is reasonable to suppose that those parts of the brain which bear to thought, emotion, and passion, the same relation as these perceiving portions do to sensation, or the entire brain, as the case may be, may undergo such changes as shall generate involuntary imaginations having no foundation in fact, emotions springing from no sufficient cause, and passions admitting of no control.

552. The same changes in the state of the organs of sense which, when they occur to waking persons, are called illusions, form, as already stated, the very staple of our dreams, which have an air of reality, partly on account of the vividness of the impressions, and partly from not being corrected, as in the waking state, by the judgment. But this is true, not only of impressions on the senses: it holds good equally of the operations of the mind, which often have about them all the reality of similar mental operations, voluntarily and consciously performed in our waking state. It would seem, therefore, that that change in the state of the brain, whatever it may be, which in waking persons occasions *illusions* of the senses, gives rise during sleep to every species of mental *delusion*.

553. These two terms, *Illusion* and *Delusion*, are here contrasted; and it is important that they should not be confounded. The distinction between them will be readily understood by the addition of three

words to each:—an *illusion* of the senses, a *delusion* of the mind. The word *phantasm* may be used as a synonym of illusion. The term *hallucination* is sometimes employed in the sense of illusion, sometimes of delusion. It is a term, therefore, which might be advantageously allowed to fall into disuse. When an illusion of the senses continues to be mistaken for a real sensation, through inability to distinguish the one from the other, it becomes a delusion.

554. *Dreaming* is a state of mind in which illusions of the senses and delusions of the mind arise spontaneously while the senses are closed to the external world, and every voluntary effort of the mind is suspended, or very imperfectly exercised.

555. There is reason to believe that many of our dreams have for their exciting cause some bodily sensation, which is either not recognised as such, or is blended with fanciful accompaniments. When the sensation is unusually distinct, and especially when it is extremely painful, it gives rise either to a dream of which it forms a part, or to one which resembles the sensation in the one particular of being painful or distressing. Thus a blister applied to the head suggests to a sleeping man a dream of being scalped by savages; and a loud noise, a dream of being shot as a deserter; on the other hand, a painful tumour or diseased hip-joint may merely occasion distressing dreams having no reference whatever to the sensation or to the part affected. And, wonderful to relate, the sensation which really gives rise to the dream shall seem to be the last link in a long chain of events which would have occupied hours, days, or even years.

556. Recent impressions on the senses, or recent transactions in which the sleeper has been engaged, also give rise to long trains of thought, and stimulate the fancy to the invention of connected histories of unreal occurrences. Thus, a patient of the Editor, suffering from obstinate constipation requiring the use of mechanical means, when sleeping under the influence of opium, after having received an encouraging opinion of his case, dreamed that his doctor was an engineer to a railroad in which he was interested, and had assured him that there were no engineering difficulties which might not be easily overcome.

557. In many persons of unsound mind the analogy existing in their mental operations to this class of dreams is too obvious to be overlooked. Real sensations are mixed up, as in dreaming, with unreal accompaniments; and real events passing in the world receive fanciful interpretations, or are forced into an unnatural relationship with their own thoughts. Thus the dream of the patient just cited finds a parallel in the waking fancy of a speculating madman who came also under the Editor's notice, and who, when railroads, the Oregon dispute, and the China war were dividing public attention, wanted to establish a company to run a railroad from Oregon to China.

558. There are many striking illustrations of this analogy between dreaming and madness in the painfully-interesting autobiography of a

religious maniac. The cold air blowing upon him as he is attempting to suffocate himself, in obedience to the spirits which speak within him, becomes the breath of the spirits of his sisters cooling him, and encouraging him to go through with his task. The familiar sensation of water trickling down the back is at once converted into the crystal tears of his father, whose venerable countenance he sees bending over him. His head is shaved, and he grieves because he has "received the tonsure of the Roman Catholic priesthood, a mark of the beast." The jets of gas from the fireplace become the utterance of his father's spirit, attempting to save him, but constantly obliged to return to be purified in hell-fire, from the contamination of his foul thoughts. The lowing of the cattle conveys to him articulate sounds and sentences, and the grating of the chair against the wall speaks to him in his father's voice.

559. Another convalescent from religious mania informed the Editor, that he was in the habit of looking upon his keeper at one moment as the Deity, at another moment as a man like himself; and that he habitually converted the footsteps of the keeper into articulate words and phrases, and sometimes into commands to strike him. Believing obedience to these commands to be his duty, he was surprised and confounded to find his violence resisted.

560. The analogy existing between dreaming and insanity is illustrated in a very striking manner by a case mentioned by Dr. Gregory, where insanity passed, so to speak, into dreaming; the maniac patient, for a week after his recovery, being harassed during his sleep by the same rapid and tumultuous thoughts, and the same violent passions, by which he had been agitated during his insanity.

561. Dreams are sometimes accompanied by actions of the voluntary muscles, and persons talk or walk in their sleep, or even commit acts of fatal violence in their half-waking state, in pursuance of the train of thought by which the mind is occupied.

562. Closely allied to this last-mentioned class of dreams is the state known as *somnambulism*, or *sleep-walking*, of which there are several forms and varieties. In one form, the somnambulist merely goes through, with the precision of an automaton, a succession of acts which he is accustomed to do in his waking state; in another form, he performs feats, and runs risks in doing them, which he would shudder to think of were he awake. He walks on the edge of a precipice, or on the top of a lofty building; or he will accomplish some intellectual task which had baffled him when awake.

563. Between this state of somnambulism and some forms of unsound mind there are analogies worth noting. In both there is sometimes a remarkable increase of talent, in both a complete change of character, and in both a distinct and separate affection of the intellect and of the moral faculties—an intellectual and moral somnambulism, an intellectual and a moral insanity.

564. As evincing the change of character which sometimes happens

during the sleep-walking state, the case of the Carthusian monk may be cited, who, while awake, was remarkable for simplicity, candour, and probity, but walked almost nightly in his sleep a thief, a robber, and a plunderer of the dead; or that of a pious clergyman, who, in his fits of somnambulism, would steal and hide whatever he could lay his hands upon, and once even plundered his own church; or the case of the suicidal somnambulist mentioned by Ray, who, after being watched for many successive nights, contrived to escape, and was found suspended to a tree by his feet.

565. From dreaming and somnambulism the transition is easy to certain states of the mind, due to temporary and transient causes, readily recognised, and having a very close resemblance to certain forms of unsoundness of mind, properly so called; namely, *delirium*, *delirium tremens*, and *drunkenness*.

566. *Febrile Delirium* is present in a great number of diseases which have attained a certain degree of severity, as in fever and in inflammatory affections of the internal viscera; it also follows upon severe injuries, such as burns, wounds, and fractures, supervenes upon surgical operations, and is a common effect of a great number of poisonous substances. There are two forms of febrile delirium. In the one the patient lies prostrate on his bed, utterly helpless, and muttering indistinctly. This form is present in the advanced stage of most cases of typhus fever, and is known as the muttering or typhoid delirium. The other form of delirium occasionally shows itself in the early stage of fever, though rarely in the typhus fever of large towns. It is accompanied by great excitement, and often by great display of strength, and has been sometimes confounded with mania; indeed the resemblance has in some cases been so close, that mistakes have been made, and the patient has been ordered into confinement as a lunatic. This form is called violent or furious delirium.

567. The first form of delirium is one from which the patient is easily roused by loud speaking to short efforts of attention, and to the performance of slight muscular movements, such as the protrusion of the tongue; but he soon relapses into his previous state. In some cases the utterance of the patient is sufficiently distinct to enable the attendants to discover that the mind is occupied by a dream in which real personages play a consistent part.

568. That form of delirium known as *Delirium tremens* has some peculiarities worth noting. There are *three* effects of an abuse of spirituous liquors which may be usefully distinguished. The first is the common drunken fit, in which, when the excitement takes the shape of noisy anger, no mischief is done, because there is not power or steadiness enough in the muscles to commit the threatened violence. The second state has all the characters of a maniacal paroxysm, and is sure to be brought on in certain persons whenever they indulge to excess. It is a dangerous state of violent incoherence. The third form is that commonly known as *Delirium tremens*. It is sometimes the consequence

of long habits of drinking abandoned for a time; but in other instances it comes on, as the immediate consequence of a single debauch, in the inhabitants of large towns, enfeebled by sedentary occupations, overwork, or want of proper nourishment.

569. The characteristic symptoms of this state are trembling of the hands and limbs, sleeplessness, and pallor of the countenance. The sleeplessness is the most constant symptom, but the tremor is very rarely absent. The patient is restless, anxious, timid, suspicious, and cunning; commonly fancies himself in a strange place, and under a control from which he is constantly endeavouring to escape; he is harassed and perplexed by spectral illusions and corresponding false impressions upon the sense of hearing, and fancies himself surrounded by hideous and loathsome objects, such as toads, serpents, and scorpions; and he is annoyed by strange sounds and threatening voices. His countenance, strange to say, in the midst of all these objects of horror, disgust, and annoyance, is often calm and composed; he walks about as if in a dream, and he will charge a bystander with threatening his life in a tone of the most complete indifference, as if it were quite immaterial whether he fulfilled his threat or not. In other cases, however, the patient's fears and suspicions impel him to acts of violence, and he becomes very dangerous either to himself or others.

570. The interesting and important subject of *unsound mind* is one of such large extent that only the merest outline of it can be given in this place. There are obviously two kinds of mental unsoundness, the one consisting in an imperfect development of the mind, generally coinciding with a defective development of the brain, and often with a stunted or deformed frame, and dating from birth, or manifesting itself in infancy; the other supervening in later life in persons previously of sound intellect.

571. The first of these forms of unsound mind, aptly termed *Amentia*, comprises two sub-classes, *Idiocy* and *Imbecility*, between which there is not so clear a line of demarcation as might be desired. Both terms, however, imply an original defect of intellect, and the first a greater defect than the second. The line may be most conveniently drawn by placing on the one side, as Idiots, all those unfortunate persons who, being otherwise of defective intellect, cannot be taught to speak; on the other side, as Imbeciles, those who are able to acquire this characteristic accomplishment. The class of imbeciles should also include —besides persons of originally defective intellect who admit of this amount of teaching—children whose intellectual development has been arrested in infancy or early childhood.

572. The idiot, thus defined, is an imperfectly-developed being, having a mere animal existence, obedient to the simplest calls and impulses of nature, incapable of being taught, altogether dependent upon others for support, and capable, at the best, of uttering a few articulate sounds, to which no meaning is attached.

573. Imbeciles, on the other hand, possess a certain amount of

intelligence, understand what is said to them, and can make themselves understood, remember common events, form habits of decency and propriety, and are equal to common household occupations, or to trades easily acquired. The more intelligent can be taught to read and write, and to do the simplest sums in arithmetic; and they are even capable of attaining to a certain degree of excellence in mechanics, music, and the fine arts; but they cannot acquire the amount of knowledge, or practical skill, or exercise the amount of prudence in the conduct of affairs, or of control over their passions, which are common among persons of their own rank and opportunities. The feeble control which these persons are able to exercise over their passions and propensities, coupled with the imperfect idea which they acquire of moral and legal obligations, accounts for the great number of imbeciles found among the criminal population.

574. Imbeciles in the upper ranks of society, being raised above the temptation to crime, make their defect of character felt by every kind of eccentric and irregular conduct, especially by pecuniary extravagance, arising partly from ignorance of the value of money, and partly from a want of self-control; and by intemperance. Imbeciles among the middle classes furnish their full contingent of fraudulent debtors, swindlers, and forgers.

575. There is, in fact, a moral as well as an intellectual imbecility, the counterparts of the moral and intellectual insanity presently to be mentioned, and a general imbecility, combining defective intellectual development with unbridled passions. Striking examples of moral imbecility, characterised by reckless extravagance, and an utter want of perception of the disgrace and wickedness of habitual debt, are to be found among the most eminent poets and prose writers of England.

576. The crimes of imbeciles are characterised by the same insufficiency of motive, the same folly in execution, and the same futile attempt at concealment, which mark other parts of their conduct.

577. Idiocy and imbecility in every degree, and combined with almost every variety of bodily infirmity and deformity, are to be found in certain unhealthy regions in every part of the world, but especially in low damp spots, shut out from intercourse with their neighbours, and subject to the evil of constant intermarriages; and, in a still greater degree, in deep alpine valleys, where the enlargement of the thyroid gland, known as gôitre, is superadded to other deformities. The persons so afflicted are called *Cretins*, and their malady is termed *Cretinism*.

578. The second class of unsound states of mind, or those which supervene in later life in persons previously of sound intellect, comprises a greater number of sub-classes than the two forms just considered, at the same time that each sub-class presents similar differences in degree.

579. Among these sub-classes the one that presents the nearest

analogy with idiocy and imbecility is *dementia*, which, as the name implies, consists of a loss of intellect, sudden or gradual: sudden, as when it arises from severe mental shocks or injury to the head; gradual, as in that form of it which sometimes follows severe attacks of fever, of inflammation of the brain, or of mania, and when it attends the decay of strength in the aged (*senile dementia*). The sudden attacks of dementia produce a state of mind nearly allied to idiocy, while those which come on gradually resemble more closely the different degrees of imbecility. Many cases which receive the name of dementia are indeed, in all probability, cases of imbecility not recognised as such till the capacity comes to be tested and strained by affairs of difficulty, or till some mental shock develops more completely all the weak points of the character.

580. In this class of cases it is often easy to trace the principal feature of the unsound mind, like a thread, through the whole history of the patient. Thus, an habitual debtor at school becomes an extravagant youth and an embarrassed man; as an incipient madman conceives himself to have a divine mission, involving a large outlay of money; and dies, at length, in the full conviction that he is the Saviour of mankind.

581. The cases of dementia which come on most gradually are often attended by epileptic fits, and by slowly-increasing paralysis. The cases which come on suddenly, as the result of severe shocks to the mind, are characterised sometimes by a state of utter mental vacancy, or *fatuity*, sometimes by a condition resembling well-marked imbecility, and sometimes by the fixing of the attention rigidly upon the train of thought which had accompanied the shock.

582. The remaining forms of unsound mind are comprised under the general term *mania*, which also consists of several sub-classes. Those most generally recognised are *general mania*, involving the intellect, passions, and emotions; *intellectual mania*, involving the intellect chiefly, if not exclusively; and *moral mania*, involving the moral nature to the exclusion of the intellect. There is another term in common use, especially in courts of law, namely, *lunacy*. This term is sometimes used as a synonym of mania, and serves to remind us of a class of cases in which there are lucid intervals, or intervals of sanity and freedom from excitement. The more correct term for such cases is *mania with lucid intervals*.

583. Mania, whatever the form which it assumes, sometimes comes on suddenly as the result of mental shocks, intense mental excitement, severe injury to the brain, intoxication, the sun-stroke, &c.; but more frequently it makes its approaches gradually during a period, often of several years' duration, known as the period of *incubation*. This period of imperfectly-developed mania is one of painful consciousness to the patient, and of fearful misgivings or mischievous misunderstandings to the friends. The bodily health suffers with the mind, and the disease assumes its full dimensions under the influence of some temporary excitement or disappointment.

584. *General mania*, or that form of mania in which the intellectual and moral nature are simultaneously affected, may be described as a state of raving incoherence, combining a rapid succession of thoughts, often brilliant and original, with passionate excitement and intense restlessness. In many of these cases reference is constantly being made, in language of extreme violence and gestures of intense anger, to events that occurred at or about the time of the first seizure.

585. *General intellectual mania*, or that form in which the intellect alone is affected, is admitted to be of very rare occurrence. There is, however, a form of mania in which some one emotion or passion, such as pride, vanity, or love of gain, obtains such an ascendancy over the mind as to fill it with a host of intellectual delusions. Thus, patients in whom the passion of vanity is greatly excited, will appropriate to themselves all the great intellectual performances which they have heard praised; those in whom pride is predominant, will imagine themselves a series of great men; and those in whom the love of gain is excited, will believe themselves engaged in the most extravagant and impossible speculations.

586. *Partial intellectual mania*, or *monomania*, otherwise designated as *melancholia*, admits of being subdivided into two subordinate classes, the one comprising those cases in which the unsoundness is not connected with any bodily sensation, the other in which such a sensation forms an essential part of the malady. These latter cases are sometimes known as *hypochondriasis*, sometimes as *melancholia*.

587. Cases of monomania, disconnected from any uneasy bodily sensation, are not of uncommon occurrence. Persons who believe themselves secretaries to the moon, or objects of persecution, or subjects of plots formed against their lives, belong to this class. These cases generally come on gradually, but, like one class of cases of dementia, they sometimes date from a sudden shock, as when Simon Brown, the dissenting clergyman, having killed a highwayman in a struggle, fancied ever after that the Almighty had deprived him of his immortal soul, and, stranger still, that the reigning monarch had the power of restoring it to him.

588. The second class of cases of partial intellectual mania, or those in which the disease is connected with some disordered bodily sensation, are of very common occurrence, and are remarkable not less for the extreme improbability of the interpretation which the imagination attaches to the sensation than for its pertinacity. This form of disease seems to be more common in women than in men, and often assumes the shape of imaginary pregnancy. Thus, in one case of hydatids in the womb, the female believed herself to be pregnant by the devil; and two females suffering from adhesion of the intestines after peritonitis, believed, the one, that a whole regiment of soldiers fought and struggled in her belly, the other, that the same narrow space was the scene of frequent interviews between the apostles and evangelists, the patriarchs and the pope. In men the imagination is not less active,

nor the delusions entertained less remarkable. Thus, one dyspeptic attributes his discomfort to a Caffre who got into his stomach at the Cape of Good Hope; others to men on horseback; and others again, forgetting their sex, believe that, like the Scythians of old, they have been transformed into women, and have even become pregnant.

589. Bordering upon this form of unsoundness of mind, but less easily traced to disordered bodily sensations, are such cases as those of the man who was afraid of passing his urine lest he should drown the town, or of the men who fancy that they have noses of wax or glass, or feet of straw; perhaps also the case of the woman who was afraid to bend her little finger, believing the world to hang upon it, and that of the gentleman who thought himself the Crystal Palace, and, when it was determined to remove it, accused parliament of wishing to destroy him.

590. In the least unreasonable forms which this strange malady assumes, that is to say, when the patients believe that they have frogs, toads, and serpents in their stomachs, cures have often been effected by ingeniously-contrived surgical operations. The complete success of such operations would seem to imply that the uneasy sensations which gave rise to these unsound interpretations may have entirely disappeared, and yet the mental malady remain.

591. One circumstance connected with the class of mental maladies now under consideration, and which applies more or less strictly to all forms of mental unsoundness, is the consistency with which the patient will support the part his fancy has assigned to him. If a man believes himself made of glass, he moves about with caution; if of wax, he avoids the fire and the sun; and if he thinks his head has been turned, he dresses himself accordingly.

592. This form of unsoundness of mind bears an obvious resemblance to that class of dreams which consists in an uneasy bodily sensation dressed up in imaginary accompaniments.

593. Closely allied to this last form of unsoundness, in this as in some other respects, is that class of cases in which, in lieu of an uneasy bodily sensation, there is an uneasy state of mind, due primarily to some painful shock or disappointment; this uneasy state of mind passing into a belief that some particular person, or class of persons, is conspiring against the patient, and, like the uneasy bodily sensation, clothing itself in a dreamy apparel of fanciful accompaniments. The cases of Luigi Buranelli and McNaughten both belong to this class. Buranelli's delusion, however, was purely personal; McNaughten believed himself the object of persecution by whole classes of the community. As these cases of unsoundness of mind are very commonly associated with that exaggerated estimate of the importance of certain bodily sensations which constitutes *hypochondriasis*, superficial or careless observers are apt to confound them with the more simple and harmless cases of that disease. But experience shows that these patients are very dangerous to society.

594. That form of mania which is now known as *moral mania* was not recognised till a comparatively recent period. Pinel has the credit of having first pointed it out, and Pritchard of having forcibly directed attention to it. It consists in "a morbid perversion of the natural feelings, affections, inclinations, temper, habits, and moral dispositions, without any notable lesion of the intellect, or knowing and reasoning faculties, and particularly without any maniacal hallucination." When it is combined with a similar affection of the intellect it constitutes *general mania*. It generally precedes the intellectual form, the delusions of the intellect commonly springing out of a morbid perversion of the feelings.

595. Moral mania, like intellectual mania, may be either *general* or *partial*. Of *general moral mania* Frederick William of Prussia, father of Frederick the Great, affords an excellent example, combining, as he did, drunkenness, household tyranny, religious austerity, disgusting personal habits, and repeated attempts at murder and suicide, with an intellect by no means wanting in power or culture, and no otherwise affected than as the higher powers of the mind always are by an indulgence in violent passions.

596. *Partial moral mania* consists in the undue excitement of some one passion or propensity to a degree of violence incompatible with the exercise of control by the higher faculties. In many of these cases the intellect and conscience remain intact, leading to struggles of which it is impossible to exaggerate the force or misery. The forms of this partial moral mania most generally recognised are *cleptomania*, or a propensity to theft; *erotomania*, or amorous madness (when it occurs in females, known as *nymphomania*, when in males, as *satyriasis*); *pyromania*, or a propensity to incendiarism; *dipsomania*, or a propensity to drunkenness; *homicidal monomania;* and *suicidal monomania;* to which might be properly added, an irresistible propensity to lying and begging, unconquerable pride, irrepressible vanity, unappeasable gluttony, and that most horrible form of it *lycanthrophy*, or wolf-mania. Of these several forms of partial moral mania, cleptomania and pyromania are of most common occurrence in females, the remainder in the other sex; but cases of all the forms may occur in either sex.

597. In most cases partial moral mania, whatever form it assumes, is a state of mind of some continuance; but there is a class of cases known as *instinctive mania*, in which the disease manifests itself suddenly and unexpectedly. The form in which this instinctive mania has been hitherto most frequently encountered is that of *homicidal monomania*.

598. The history of many of these cases is very remarkable. The victim of the insane violence is either a perfect stranger, or an infant incapable of giving offence, or a near relation, to whom the homicide is tenderly attached. After the fatal act no attempt is made to escape, the deed is openly confessed, and its legal punishment courted and

desired. This insane impulse, in other instances, assumes a much less simple form; the mad thirst for blood is a more chronic feeling, and, like the uneasy bodily sensations and mental states just referred to, clothes itself in the fantastic garb of monstrous intellectual delusions, as happened in the parricide Dadd.

599. The several forms of mania, general and partial, intellectual and moral, present almost infinite varieties, and occasion the greatest perplexity to medical men when they are called upon to examine patients suffering from them, to sign certificates, or to give evidence concerning them; and this perplexity is greatly increased by the very nature of the legal questions which the physician is expected to answer. Some advantage may perhaps accrue from an endeavour to bring the leading characteristics of mania together into one point of view.

600. It ought to be understood, then, that this form of unsoundness consists not in the loss of the faculties of the mind, but in their perversion; that the senses are the sport of illusions of which the patient is unable to detect the unreality, and the mind of delusions of which he cannot perceive the inconsistency or impossibility; that real sensations become, as in sleep, the materials of imaginary scenes; that the realities by which the patient is surrounded are blended with illusions, and real persons made to undergo curious transformations in obedience to his delusions; and that many of his strange antics and acts of violence are also mixed results of his illusions and delusions. At the same time, it ought to be well understood that the state of the patient's mind is subject to great variation from external and internal causes; that the transition from one state to another is often as rapid as thought itself; that he is capable of exercising, for considerable intervals of time, an extraordinary control over himself, so as to be able to conceal his delusions; that, though sometimes easily imposed upon, he often evinces, in carrying out his insane purposes, all the forethought and preparation of a sane man; that in his wildest excitement he is often so far conscious of what he is doing as to recollect it many years afterwards, his statements being confirmed by sane persons having cognizance of the facts to which the patient refers; and that he may even be conscious of his state and of the legal relations in which it places him.

601. The physiology and pathology of the mind forms a subject of such vast extent, that it has only been possible in this place to notice some of its more salient points. The reader is referred for more complete information respecting it to such works as Abercrombie on the Intellectual Powers, or to special treatises on Insanity.

CHAPTER IV.

EXAMINATION OF THE MORE IMPORTANT SYMPTOMS AND SIGNS OF DISEASE.

602. AMONG the symptoms and signs of disease there is one of such acknowledged importance in the diagnosis and treatment of all disorders and diseases, without exception, as to make it a fitting subject for a separate treatise, namely, the pulse. There is also one subject for clinical examination, which, involving, as it does, the employment of the microscope and of chemical reagents, is equally entitled to separate treatment, namely, the urine. Again, the diseases of the heart and lungs are of such frequent occurrence and of such importance in themselves, and the signs which indicate them so numerous, that these, too, may justly claim to be treated with similar respect. Lastly, there are other symptoms and signs of great value in the diagnosis and treatment of disease which are either less clear in the indications they afford, or less difficult to understand and appreciate, so that it is usually deemed sufficient to handle them together in a general treatise on Symptomatology. Such are the tongue, the sputa, the evacuations from the bowels, the attitude of the body, and the expression of the countenance. These considerations have led to the divisions adopted in the present chapter, in which five leading subjects are treated separately, and the remainder thrown into one group at the end. The contents of the present chapter are: 1, Examination of the Urine; 2, of the Abdomen; 3, of the Chest, and the organs of Respiration and Circulation; 4, of the Pulse; 5, of the Respiration; 6, of other Symptoms and Signs of Disease.

1. THE URINE.

Properties of Healthy Urine.

603. *Physical Properties.*—Healthy urine, recently voided, has the temperature of the body. It is perfectly transparent, and of a light amber colour. Its odour is peculiar, but not unpleasant, and disappears on cooling. Its taste is salt and bitter. Its specific gravity ranges from 1005 to 1033.

604. *Chemical Properties.*—Healthy urine has a slight acid reaction. It remains unchanged when heated to the boiling point. It yields no

precipitates with the mineral acids; but oxalic acid produces a slight cloud of oxalate of lime, and the free alkalies throw down a precipitate of the phosphate of lime. The salts of baryta, silver, and lead, also cause precipitates; and tannin occasions a slight cloudiness.

605. *Effects of Decomposition.*—After standing some time, slight clouds of mucus form in the urine, and gradually fall to the bottom of the vessel. Decomposition soon follows, marked by an unpleasant odour and an alkaline reaction; carbonate of ammonia is formed, and may be detected by effervescing with acids; and the ammoniaco-magnesian phosphate and phosphate of lime are thrown down. A portion of these salts entangled by mucus form a scum in which we may detect, under the microscope, crystals of ammoniaco-magnesian phosphate mixed with the constituents of mucus and with amorphous phosphate of lime. Decomposition continuing to advance, the odour becomes still more disagreeable, and a blue or gray mould forms on the surface; while prismatic crystals of common salt, muriate of ammonia, and phospate of soda and ammonia, collect at the bottom or cling to the sides of the vessel.

606. *Constituents of Healthy Urine.*—These may be divided into organic and inorganic. The *organic* constituents consist of urea, uric or lithic acid, hippuric and lactic acids, salts of ammonia, and extractive matters, with small quantities of creatine and creatinine. The *inorganic* constituents consist of carbonic, hydrochloric, sulphuric, and phosphoric acids in combination with the bases, soda, potash, magnesia, and lime, with traces of silica. These organic and inorganic constituents are dissolved or suspended in a variable quantity of water.

607. On account of this variation in the quantity of water, on the one hand, and of the solid constituents due to age, sex, time of day, character of food, and amount of exercise on the other, it is only possible to give an approximate analysis of this fluid. This is done in the following table, which is a rude approximation, in round numbers, to the mean of a considerable number of recorded analyses:—

Water	950
Urea	25
Uric Acid . . .	1
Fixed Salts . . .	14
Organic Matter . .	10
	1,000

608. The constituents of the urine, when obtained from the solid residue, so as to remove the more variable element of the water, are still subject to wide variations even in health, as will be seen from the following table, which is also founded on several analyses.

In 1,000 parts of the solid residue, the greatest, least, and average quantities of the several ingredients were as follows:—

	Max.	Min.	Mean.
Urea	500	300	420
Uric Acid	16	14	15
Extractive Matter, Chloride of Sodium and Salts of Ammonia .	509	258	381
Alkaline Sulphates . . .	120	81	103
Alkaline Phosphates . . .	68	45	59
Phosphate of Lime and Magnesia .	19	14	16

609. *Quantity voided in Twenty-four Hours.*—This varies in different persons, and in the same person at different times and under different circumstances. The following are some of the estimates of authors:—Haller, 49 oz.; Simon, 45 oz.; Keill, 38 oz.; Christison, 35 oz.; Prout, 32 oz. (30 oz. in the summer and 40 oz. in the winter); Rayer, from 21 to 57 oz.; Dr. Dalton's experiments on his own person give 48½ oz. (month of November), 51½ oz. (month of June). The average of these experiments and estimates is about 41 oz., or little more than two imperial pints.

610. The quantity of the urine in a healthy subject is chiefly determined by the quantity of liquid taken into the stomach; but it is affected by a variety of other causes. It varies inversely as the quantity of the pulmonary and cutaneous exhalation. Hence it is greater in winter than in summer, in a cold than in a warm atmosphere, in a moist than in a dry state of the air. It is greater during the day than during the same number of hours at night, and it is greater in the morning than in the evening. It is also increased by excitement and anxiety of mind.

611. In disease, also, the quantity of urine is increased whenever the pulmonary and cutaneous transpiration is suppressed, excepting only those cases in which all the secretions are simultaneously diminished by high febrile action. In the cold stage of ague, under strong nervous excitement, and in hysterical paroxysms, an increased flow of urine takes place. This increase, which in extreme cases may amount to 30 or 40 pints daily, is not accompanied by any change in the solid constituents of the urine. But in other cases the increase in the quantity of water is attended by an increase of the solid contents, or by the introduction of an abnormal constituent, such as sugar or chyle.

612. On the other hand, the quantity of the urine is diminished by increase of the cutaneous and pulmonary transpiration, by profuse diarrhœa, in cholera, by hæmorrhage, in dropsy, in many forms of acute inflammation, and in the inflammatory stage of fever. It is suppressed, or greatly diminished, in inflammation of the kidney, and under the operation of the more active irritant poisons.

613. The quantity of the solid constituents of the urine is also subject to considerable differences in healthy persons. The most important constituents, urea and uric acid, are at a maximum in men in the prime of life, less abundant in females, and at a minimum in old age and childhood. They are increased by exercise and diminished by

rest, increased under an animal diet, and diminished when vegetable food only is taken.

614. *Density of the Urine.*—The density of healthy urine ranges from 1,005 to 1,033, and its average density may be stated at 1,020 or 1,025. According to Simon, it has a range of from 1,005 to 1,030, and an average of 1,012; and according to Dr. J. C. Gregory a range for middle and adult age of from 1,005 to 1,033. According to the accurate observations of the last-named observer, the greatest range in the same individual is 21 degrees, the ordinary range from 1,016 to 1,031, and the average of 363 experiments on 50 individuals, 1,022·5. The average for 5 individuals whose urine was examined between 20 and 50 times each was 1,025·2.

615. The density of the urine is greater in males than females; it increases from childhood to manhood, and falls again in old age; it is increased by hot weather, by much exercise, by free perspiration, by a very dry diet, by animal diet, by substances containing much azote, by the meal of dinner, and during sleep. It is diminished by cold, by sedentary habits, by a watery diet, by vegetable food, by acids, and alcoholic fluids. It is at its average in the morning on waking; it falls considerably after breakfast; it rises again gradually after mid-day; it sinks again immediately after dinner, but in a few hours rises higher than at any other time; and in the course of the night gradually returns again towards its average.

616. The urine secreted after the digestion of food differs widely from that which is secreted after fluids have been taken. The former, the "urina chyli," contains, according to Nysten, thirteen times as much urea, sixteen times as much uric acid, and four times as large a quantity of salts as the latter, the "urina potus." It has also an alkaline reaction. The first urine passed after a meal, with which much water is taken, would probably be found to be nearly allied to the "urina potus," but to contain somewhat more animal matter.

617. The density of the urine in disease may vary from 1,001 to 1,055; and as the density in health does not appear to fall below 1,005, nor rise above 1,033, it follows that any number less than 1,005 and above 1,033 should be regarded as a sign of disease, and any number approaching either limit ought to attract attention. A less density than 1,005 points to an increase in the quantity of the urine, with a diminution of some of its solid constituents. A greater density than 1,033 strongly indicates diabetes, though 1,030—1,035 has been observed in cases of increased secretion with excess of urea.

618. The *solids* discharged in 24 hours amount on an average to less than an ounce and a half. In a vigorous, healthy adult male they may be taken at two ounces, or 1,000 grains. In disease they have been known to amount to 36 ounces avoirdupois, and to fall as low as 11 grains.

619. The *colour* of healthy urine is inversely as its quantity; when

scanty it is high coloured; when abundant, pale. The urine first passed in the morning is usually of a higher colour than that passed later in the day. The urine is pale in all diseases accompanied with an increase of quantity; whilst the natural colour is deepened by a decrease in the quantity. It may be white, or bluish-white, and turbid from the admixture of chyle, milk, mucus, or pus, or of the earthy phosphates in excess; deep yellow, or greenish yellow, from bile or the cystic oxide; dark red or purplish, from the admixture of the purpurates, as in inflammatory diseases; yellow-red, as in hectic and the sweating stage of intermittent fevers; brownish or cherry-red, from the admixture of the red particles of the blood; black, from the admixture of melanic acid; blue, from the cyanuric acid, &c. Several substances taken with the food, such as rhubarb, madder, beet-root, corn-poppy, and logwood, are also said to give a similar colour to the urine with that produced by blood.

620. The natural *odour* of the urine is wanting when it is abundant and pale, and well marked when it is scanty and high-coloured: it is altered by various articles of food, such as asparagus: it is aromatic in many nervous affections; ammoniacal in injuries of the spinal cord; putrid from the admixture of pus or mucus, in diseases of the urinary organs, and in the last stages of putrid fevers; sweetish in diabetes mellitus; and it has the odour of sweetbriar or of violets when it contains cystine, and probably under other circumstances.

621. The *taste* of the urine is perceptibly sweet in well-marked cases of diabetes mellitus.

The Urine in Disease.

622. The abnormal conditions of the urine may be divided into two classes:—

(1.) The normal constituents of the urine (§ 606) may be in excess, or altogether absent.

(2.) The urine may contain substances foreign to its normal composition.

623. This second class admits of further subdivision as follows:—

(1.) Salts of ammonia and lime, of which one or other of the constituents, or both, exist in healthy urine, namely, carbonate of ammonia, carbonate of lime, and oxalate of lime.

(2.) Substances which result from the imperfect assimilation of the food, or from the defective power of elimination of the kidney; namely, cystine, chyle, fat, milk, sugar, and bile, to which may be added the kiestein, found in the urine of pregnant women.

(3.) The blood or its constituents, the red particles, fibrin, and albumen.

(4.) Secretions of the lining membrane of the urinary organs; namely, mucus, and epithelial scales (these exist in small quantity in healthy urine, and belong to the 1st division), and pus; to which must be added casts of the urinary tubes.

(5.) Admixture of animal secretions derived from neighbouring organs, as semen and the gonorrhœal and leucorrhœal discharges.

(6.) Poisons and substances used as medicines, of which the list is almost coextensive with the substances themselves, comprising the principal metallic bases, the non-metallic bodies, the organic and inorganic acids, and their salts, and the more active animal and vegetable poisons.

Examination of the Urine.

624. For this purpose the medical man must resort to chemical tests and to the microscope. Our tests have sometimes to be applied to the urine as it is passed; in other instances the urine having been allowed to remain at rest for some time, we examine in turn the clear supernatant portion and the deposit. The microscope is generally employed to identify the deposited matters, or those thrown down by chemical reagents.

625. *Tests.*—The tests in most common use are turmeric and litmus paper, heat, and nitric acid. Hydrochloric and acetic acids, liquor ammoniæ, and liquor potassæ are also frequently employed; and, for certain purposes, a solution of oxalate of ammonia, a solution of sulphate of copper, a solution of oxalic acid, and alcohol are required. A spirit-lamp, and fragment of platinum foil, and an urinometer, or 1,000 grain-bottle, complete the list of materials required for the chemical examination of the urine for common purposes.

626. The apparatus required for microscopic examinations, in addition to the microscope itself, consists of a few conical glasses (wine-glasses with narrow stems will answer the purpose), for collecting deposits, and a *pipette*. The deposits which we desire to examine under the microscope are allowed to collect for several hours in the bottom of the glass, are then drawn off by the pipette, and placed in a glass cell; or a drop of the urine is placed on a glass slide, and protected by a fragment of thin glass.

627. The urine submitted to examination in cases of disease, should be either an average specimen of the entire day, or that voided on first rising in the morning.

628. In examining the urine, great care should be taken to avoid the introduction of extraneous matters. The urine reserved for examination should be protected by a cover, and the same precaution should be used in collecting deposits.

The extraneous substances likely to be found in the urine are depicted in Dr. Beale's "Use of the Microscope in Clinical Medicine illustrated."

629. In order to present a complete view of this subject, it will be expedient first to detail the principal indications of the tests, and, secondly, to describe the chemical and microscopical properties of the several constituents of the urine in health or disease.

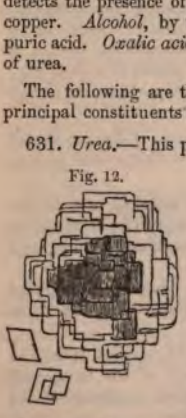
630. *Turmeric paper* is changed from yellow to brown, when the urine is alkaline; blue *litmus paper* to red when the urine is acid. *Heat* throws down albumen, and the phosphates when they are in excess, but dissolves the urates of soda and ammonia. *Nitric acid.*—This acid

throws down a dead-white precipitate of albumen; it precipitates uric acid after the lapse of some hours, and dissolves it with effervescence; it also dissolves the oxalate of lime and the alkaline and earthy phosphates; it precipitates the colouring matter of bile of a green colour, but if added in excess, it changes it quickly to a dingy red, and afterwards to a brown; it also detects urea in excess, when added to an equal quantity of urine, by the formation of crystals of nitrate of urea. Moreover, it produces a cloudiness in urine containing certain essential oils. *Hydrochloric acid* precipitates uric and hippuric acid and the colouring matter of the bile. It throws down the latter of a green colour, whatever quantity may be added. It also dissolves the oxalate of lime, cystine, and the phosphates. *Acetic acid* produces a cloudiness in urine containing mucus; it dissolves the alkaline phosphates, and the phosphate of lime sparingly. *Sulphuric acid*, added to warm urine containing sugar or albumen, causes a deposit of carbon. *Caustic ammonia* throws down the earthy phosphates as a white precipitate, and dissolves cystine; its vapour imparts a rich purple hue to the crystals of uric acid. The *oxalate of ammonia* is used to detect the presence of the phosphate of lime. *Caustic potash* dissolves uric acid and the urates of soda and ammonia. With the aid of heat it disengages ammonia from the urate of ammonia; it also changes saccharine urine to a dark-brown colour, and thickens purulent deposits. A *solution of sulphate of copper*, previously rendered strongly alkaline by caustic potash, when heated with saccharine urine, detects the presence of sugar by causing a deposit of the red oxide of copper. *Alcohol*, by the aid of heat, dissolves cholesterine, and hippuric acid. *Oxalic acid in solution* throws down a characteristic oxalate of urea.

The following are the chemical and microscopical characters of the principal constituents of the urine in health and disease.

631. *Urea.*—This principle in excess gives a high specific gravity to the urine (1·030—1·035). If abundant, it may be detected by adding to a small quantity of urine in a watch-glass an equal bulk of strong nitric acid. If this is kept in a cool place, crystals of nitrate of urea are formed. If, however, the quantity of urea is small, we must evaporate before applying the nitric acid.

Fig. 12.



The best process for detecting urea and obtaining well-formed crystals of nitrate of urea is the following: Evaporate a portion of urine in a water-bath to the consistence of a syrup; add strong alcohol, filter the alcoholic solution, and evaporate it in the water-bath nearly to dryness; add a few drops of water and of strong nitric acid. Crystals of nitrate of urea are speedily formed, which assume, under the microscope, the form depicted in fig. 12. For practical purposes the presence of urea

may be readily detected by evaporating a few drops of urine on a fragment of glass, and adding an equal quantity of nitric acid.

If we substitute oxalic acid for nitric acid, we obtain crystals of the microscopic form annexed :—

Fig. 13.



The alcoholic extract of urea leaves, on spontaneous evaporation, acicular crystals of the following form :—

Fig. 14.



632. *Uric Acid.*—Uric or lithic acid sometimes exists in the urine in such quantity as to separate from it, on cooling, in the form of a crystalline deposit. It is very rarely voided as gravel; but it is a frequent constituent of urinary calculi. Uric acid, as existing in urinary deposits, has every tint from light yellow to deep orange-red, or dark brown; and occasionally it is quite free from colour. Hence the familiar names of "yellow and red sand."

Urine which yields uric acid deposits has generally a higher colour than natural, an acid reaction, and a specific gravity of 1·020 or more. Uric acid may be separated from urine which yields no deposit on cooling, by adding hydrochloric acid in the proportion of two or three drachms to six or eight ounces of urine. The mixture, on being allowed to stand in a covered vessel for twenty-four to forty-eight hours, yields a red or reddish-brown sediment of uric acid.

The crystals also vary in size from grains visible to the naked eye, and known as *Cayenne pepper grains*, to a fine granular deposit, in which the characteristic forms of the crystal are only to be detected under high powers of the microscope.

Uric acid has the following chemical characters. It is insoluble in hot and cold water; it is not redissolved when the urine is heated; it is very soluble in caustic potash, and precipitated granular and colourless from this menstruum by the addition of an acid in excess; it is dissolved by nitric acid with effervescence, and on evaporation to dryness yields a red or pink residue, which is changed to a rich purple (murexide) when exposed to the vapour of ammonia. Heated on

594. That form of mania which is now known as *moral mania* was not recognised till a comparatively recent period. Pinel has the credit of having first pointed it out, and Pritchard of having forcibly directed attention to it. It consists in "a morbid perversion of the natural feelings, affections, inclinations, temper, habits, and moral dispositions, without any notable lesion of the intellect, or knowing and reasoning faculties, and particularly without any maniacal hallucination." When it is combined with a similar affection of the intellect it constitutes *general mania*. It generally precedes the intellectual form, the delusions of the intellect commonly springing out of a morbid perversion of the feelings.

595. Moral mania, like intellectual mania, may be either *general* or *partial*. Of *general moral mania* Frederick William of Prussia, father of Frederick the Great, affords an excellent example, combining, as he did, drunkenness, household tyranny, religious austerity, disgusting personal habits, and repeated attempts at murder and suicide, with an intellect by no means wanting in power or culture, and no otherwise affected than as the higher powers of the mind always are by an indulgence in violent passions.

596. *Partial moral mania* consists in the undue excitement of some one passion or propensity to a degree of violence incompatible with the exercise of control by the higher faculties. In many of these cases the intellect and conscience remain intact, leading to struggles of which it is impossible to exaggerate the force or misery. The forms of this partial moral mania most generally recognised are *cleptomania*, or a propensity to theft; *erotomania*, or amorous madness (when it occurs in females, known as *nymphomania*, when in males, as *satyriasis*); *pyromania*, or a propensity to incendiarism; *dipsomania*, or a propensity to drunkenness; *homicidal monomania*; and *suicidal monomania*; to which might be properly added, an irresistible propensity to lying and begging, unconquerable pride, irrepressible vanity, unappeasable gluttony, and that most horrible form of it *lycanthrophy*, or wolf-mania. Of these several forms of partial moral mania, cleptomania and pyromania are of most common occurrence in females, the remainder in the other sex; but cases of all the forms may occur in either sex.

597. In most cases partial moral mania, whatever form it assumes, is a state of mind of some continuance; but there is a class of cases known as *instinctive mania*, in which the disease manifests itself suddenly and unexpectedly. The form in which this instinctive mania has been hitherto most frequently encountered is that of *homicidal monomania*.

598. The history of many of these cases is very remarkable. The victim of the insane violence is either a perfect stranger, or an infant incapable of giving offence, or a near relation, to whom the homicide is tenderly attached. After the fatal act no attempt is made to escape, *the deed is openly* confessed, and its legal punishment courted and

desired. This insane impulse, in other instances, assumes a much less simple form; the mad thirst for blood is a more chronic feeling, and, like the uneasy bodily sensations and mental states just referred to, clothes itself in the fantastic garb of monstrous intellectual delusions, as happened in the parricide Dadd.

599. The several forms of mania, general and partial, intellectual and moral, present almost infinite varieties, and occasion the greatest perplexity to medical men when they are called upon to examine patients suffering from them, to sign certificates, or to give evidence concerning them; and this perplexity is greatly increased by the very nature of the legal questions which the physician is expected to answer. Some advantage may perhaps accrue from an endeavour to bring the leading characteristics of mania together into one point of view.

600. It ought to be understood, then, that this form of unsoundness consists not in the loss of the faculties of the mind, but in their perversion; that the senses are the sport of illusions of which the patient is unable to detect the unreality, and the mind of delusions of which he cannot perceive the inconsistency or impossibility; that real sensations become, as in sleep, the materials of imaginary scenes; that the realities by which the patient is surrounded are blended with illusions, and real persons made to undergo curious transformations in obedience to his delusions; and that many of his strange antics and acts of violence are also mixed results of his illusions and delusions. At the same time, it ought to be well understood that the state of the patient's mind is subject to great variation from external and internal causes; that the transition from one state to another is often as rapid as thought itself; that he is capable of exercising, for considerable intervals of time, an extraordinary control over himself, so as to be able to conceal his delusions; that, though sometimes easily imposed upon, he often evinces, in carrying out his insane purposes, all the forethought and preparation of a sane man; that in his wildest excitement he is often so far conscious of what he is doing as to recollect it many years afterwards, his statements being confirmed by sane persons having cognizance of the facts to which the patient refers; and that he may even be conscious of his state and of the legal relations in which it places him.

601. The physiology and pathology of the mind forms a subject of such vast extent, that it has only been possible in this place to notice some of its more salient points. The reader is referred for more complete information respecting it to such works as Abercrombie on the Intellectual Powers, or to special treatises on Insanity.

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CHAPTER IV.

EXAMINATION OF THE MORE IMPORTANT SYMPTOMS AND SIGNS OF DISEASE.

602. AMONG the symptoms and signs of disease there is one of such acknowledged importance in the diagnosis and treatment of all disorders and diseases, without exception, as to make it a fitting subject for a separate treatise, namely, the pulse. There is also one subject for clinical examination, which, involving, as it does, the employment of the microscope and of chemical reagents, is equally entitled to separate treatment, namely, the urine. Again, the diseases of the heart and lungs are of such frequent occurrence and of such importance in themselves, and the signs which indicate them so numerous, that these, too, may justly claim to be treated with similar respect. Lastly, there are other symptoms and signs of great value in the diagnosis and treatment of disease which are either less clear in the indications they afford, or less difficult to understand and appreciate, so that it is usually deemed sufficient to handle them together in a general treatise on Symptomatology. Such are the tongue, the sputa, the evacuations from the bowels, the attitude of the body, and the expression of the countenance. These considerations have led to the divisions adopted in the present chapter, in which five leading subjects are treated separately, and the remainder thrown into one group at the end. The contents of the present chapter are: 1, Examination of the Urine; 2, of the Abdomen; 3, of the Chest, and the organs of Respiration and Circulation; 4, of the Pulse; 5, of the Respiration; 6, of other Symptoms and Signs of Disease.

1. THE URINE.

Properties of Healthy Urine.

603. *Physical Properties.*—Healthy urine, recently voided, has the temperature of the body. It is perfectly transparent, and of a light amber colour. Its odour is peculiar, but not unpleasant, and disappears on cooling. Its taste is salt and bitter. Its specific gravity ranges from 1005 to 1033.

604. *Chemical Properties.*—Healthy urine has a slight acid reaction. It remains unchanged when heated to the boiling point. It yields no

precipitates with the mineral acids; but oxalic acid produces a slight cloud of oxalate of lime, and the free alkalies throw down a precipitate of the phosphate of lime. The salts of baryta, silver, and lead, also cause precipitates; and tannin occasions a slight cloudiness.

605. *Effects of Decomposition.*—After standing some time, slight clouds of mucus form in the urine, and gradually fall to the bottom of the vessel. Decomposition soon follows, marked by an unpleasant odour and an alkaline reaction; carbonate of ammonia is formed, and may be detected by effervescing with acids; and the ammoniaco-magnesian phosphate and phosphate of lime are thrown down. A portion of these salts entangled by mucus form a scum in which we may detect, under the microscope, crystals of ammoniaco-magnesian phosphate mixed with the constituents of mucus and with amorphous phosphate of lime. Decomposition continuing to advance, the odour becomes still more disagreeable, and a blue or gray mould forms on the surface; while prismatic crystals of common salt, muriate of ammonia, and phospate of soda and ammonia, collect at the bottom or cling to the sides of the vessel.

606. *Constituents of Healthy Urine.*—These may be divided into organic and inorganic. The *organic* constituents consist of urea, uric or lithic acid, hippuric and lactic acids, salts of ammonia, and extractive matters, with small quantities of creatine and creatinine. The *inorganic* constituents consist of carbonic, hydrochloric, sulphuric, and phosphoric acids in combination with the bases, soda, potash, magnesia, and lime, with traces of silica. These organic and inorganic constituents are dissolved or suspended in a variable quantity of water.

607. On account of this variation in the quantity of water, on the one hand, and of the solid constituents due to age, sex, time of day, character of food, and amount of exercise on the other, it is only possible to give an approximate analysis of this fluid. This is done in the following table, which is a rude approximation, in round numbers, to the mean of a considerable number of recorded analyses:—

Water	950
Urea	25
Uric Acid . . .	1
Fixed Salts . . .	14
Organic Matter . .	10
	1,000

608. The constituents of the urine, when obtained from the solid residue, so as to remove the more variable element of the water, are still subject to wide variations even in health, as will be seen from the following table, which is also founded on several analyses.

In 1,000 parts of the solid residue, the greatest, least, and average quantities of the several ingredients were as follows:—

	Max.	Min.	Mean.
Urea	500	300	420
Uric Acid	16	14	15
Extractive Matter, Chloride of Sodium and Salts of Ammonia .	509	258	381
Alkaline Sulphates . . .	120	81	103
Alkaline Phosphates . . .	68	45	59
Phosphate of Lime and Magnesia .	19	14	16

609. *Quantity voided in Twenty-four Hours.*—This varies in different persons, and in the same person at different times and under different circumstances. The following are some of the estimates of authors:—Haller, 49 oz.; Simon, 45 oz.; Keill, 38 oz.; Christison, 35 oz.; Prout, 32 oz. (30 oz. in the summer and 40 oz. in the winter); Rayer, from 21 to 57 oz.; Dr. Dalton's experiments on his own person give 48½ oz. (month of November), 51½ oz. (month of June). The average of these experiments and estimates is about 41 oz., or little more than two imperial pints.

610. The quantity of the urine in a healthy subject is chiefly determined by the quantity of liquid taken into the stomach; but it is affected by a variety of other causes. It varies inversely as the quantity of the pulmonary and cutaneous exhalation. Hence it is greater in winter than in summer, in a cold than in a warm atmosphere, in a moist than in a dry state of the air. It is greater during the day than during the same number of hours at night, and it is greater in the morning than in the evening. It is also increased by excitement and anxiety of mind.

611. In disease, also, the quantity of urine is increased whenever the pulmonary and cutaneous transpiration is suppressed, excepting only those cases in which all the secretions are simultaneously diminished by high febrile action. In the cold stage of ague, under strong nervous excitement, and in hysterical paroxysms, an increased flow of urine takes place. This increase, which in extreme cases may amount to 30 or 40 pints daily, is not accompanied by any change in the solid constituents of the urine. But in other cases the increase in the quantity of water is attended by an increase of the solid contents, or by the introduction of an abnormal constituent, such as sugar or chyle.

612. On the other hand, the quantity of the urine is diminished by increase of the cutaneous and pulmonary transpiration, by profuse diarrhœa, in cholera, by hæmorrhage, in dropsy, in many forms of acute inflammation, and in the inflammatory stage of fever. It is suppressed, or greatly diminished, in inflammation of the kidney, and under the operation of the more active irritant poisons.

613. The quantity of the solid constituents of the urine is also subject to considerable differences in healthy persons. The most important constituents, urea and uric acid, are at a maximum in men in the prime of life, less abundant in females, and at a minimum in old age and childhood. They are increased by exercise and diminished by

rest, increased under an animal diet, and diminished when vegetable food only is taken.

614. *Density of the Urine.*—The density of healthy urine ranges from 1,005 to 1,033, and its average density may be stated at 1,020 or 1,025. According to Simon, it has a range of from 1,005 to 1,030, and an average of 1,012; and according to Dr. J. C. Gregory a range for middle and adult age of from 1,005 to 1,033. According to the accurate observations of the last-named observer, the greatest range in the same individual is 21 degrees, the ordinary range from 1,016 to 1,031, and the average of 363 experiments on 50 individuals, 1,022·5. The average for 5 individuals whose urine was examined between 20 and 50 times each was 1,025·2.

615. The density of the urine is greater in males than females; it increases from childhood to manhood, and falls again in old age; it is increased by hot weather, by much exercise, by free perspiration, by a very dry diet, by animal diet, by substances containing much azote, by the meal of dinner, and during sleep. It is diminished by cold, by sedentary habits, by a watery diet, by vegetable food, by acids, and alcoholic fluids. It is at its average in the morning on waking; it falls considerably after breakfast; it rises again gradually after mid-day; it sinks again immediately after dinner, but in a few hours rises higher than at any other time; and in the course of the night gradually returns again towards its average.

616. The urine secreted after the digestion of food differs widely from that which is secreted after fluids have been taken. The former, the "urina chyli," contains, according to Nysten, thirteen times as much urea, sixteen times as much uric acid, and four times as large a quantity of salts as the latter, the "urina potus." It has also an alkaline reaction. The first urine passed after a meal, with which much water is taken, would probably be found to be nearly allied to the "urina potus," but to contain somewhat more animal matter.

617. The density of the urine in disease may vary from 1,001 to 1,055; and as the density in health does not appear to fall below 1,005, nor rise above 1,033, it follows that any number less than 1,005 and above 1,033 should be regarded as a sign of disease, and any number approaching either limit ought to attract attention. A less density than 1,005 points to an increase in the quantity of the urine, with a diminution of some of its solid constituents. A greater density than 1,033 strongly indicates diabetes, though 1,030—1,035 has been observed in cases of increased secretion with excess of urea.

618. The *solids* discharged in 24 hours amount on an average to less than an ounce and a half. In a vigorous, healthy adult male they may be taken at two ounces, or 1,000 grains. In disease they have been known to amount to 36 ounces avoirdupois, and to fall as low as 11 grains.

619. The *colour* of healthy urine *is inversely* as its quantity; when

scanty it is high coloured; when abundant, pale. The urine first passed in the morning is usually of a higher colour than that passed later in the day. The urine is pale in all diseases accompanied with an increase of quantity; whilst the natural colour is deepened by a decrease in the quantity. It may be white, or bluish-white, and turbid from the admixture of chyle, milk, mucus, or pus, or of the earthy phosphates in excess; deep yellow, or greenish yellow, from bile or the cystic oxide; dark red or purplish, from the admixture of the purpurates, as in inflammatory diseases; yellow-red, as in hectic and the sweating stage of intermittent fevers; brownish or cherry-red, from the admixture of the red particles of the blood; black, from the admixture of melanic acid; blue, from the cyanuric acid, &c. Several substances taken with the food, such as rhubarb, madder, beet-root, corn-poppy, and logwood, are also said to give a similar colour to the urine with that produced by blood.

620. The natural *odour* of the urine is wanting when it is abundant and pale, and well marked when it is scanty and high-coloured: it is altered by various articles of food, such as asparagus: it is aromatic in many nervous affections; ammoniacal in injuries of the spinal cord; putrid from the admixture of pus or mucus, in diseases of the urinary organs, and in the last stages of putrid fevers; sweetish in diabetes mellitus; and it has the odour of sweetbriar or of violets when it contains cystine, and probably under other circumstances.

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The Urine in Disease.

622. The abnormal conditions of the urine may be divided into two classes:—

(1.) The normal constituents of the urine (§ 606) may be in excess, or altogether absent.

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(2.) Substances which result from the imperfect assimilation of the food, or from the defective power of elimination of the kidney; namely, cystine, chyle, fat, milk, sugar, and bile, to which may be added the kiestein, found in the urine of pregnant women.

(3.) The blood or its constituents, the red particles, fibrin, and albumen.

(4.) Secretions of the lining membrane of the urinary organs; namely, mucus, and epithelial scales (these exist in small quantity in healthy urine, and belong to the 1st division), and pus; to which must be added casts of the urinary tubes.

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Examination of the Urine.

624. For this purpose the medical man must resort to chemical tests and to the microscope. Our tests have sometimes to be applied to the urine as it is passed; in other instances the urine having been allowed to remain at rest for some time, we examine in turn the clear supernatant portion and the deposit. The microscope is generally employed to identify the deposited matters, or those thrown down by chemical reagents.

625. *Tests.*—The tests in most common use are turmeric and litmus paper, heat, and nitric acid. Hydrochloric and acetic acids, liquor ammoniæ, and liquor potassæ are also frequently employed; and, for certain purposes, a solution of oxalate of ammonia, a solution of sulphate of copper, a solution of oxalic acid, and alcohol are required. A spirit-lamp, and fragment of platinum foil, and an urinometer, or 1,000 grain-bottle, complete the list of materials required for the chemical examination of the urine for common purposes.

626. The apparatus required for microscopic examinations, in addition to the microscope itself, consists of a few conical glasses (wine-glasses with narrow stems will answer the purpose), for collecting deposits, and a *pipette*. The deposits which we desire to examine under the microscope are allowed to collect for several hours in the bottom of the glass, are then drawn off by the pipette, and placed in a glass cell; or a drop of the urine is placed on a glass slide, and protected by a fragment of thin glass.

627. The urine submitted to examination in cases of disease, should be either an average specimen of the entire day, or that voided on first rising in the morning.

628. In examining the urine, great care should be taken to avoid the introduction of extraneous matters. The urine reserved for examination should be protected by a cover, and the same precaution should be used in collecting deposits.

The extraneous substances likely to be found in the urine are depicted in Dr. Beale's "Use of the Microscope in Clinical Medicine illustrated."

629. In order to present a complete view of this subject, it will be expedient first to detail the principal indications of the tests, and, secondly, to describe the chemical and microscopical properties of the several constituents of the urine in health or disease.

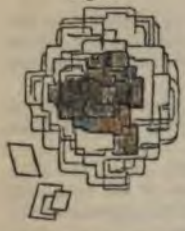
630. *Turmeric paper* is changed from yellow to brown, when the urine is alkaline; blue *litmus paper* to red when the urine is acid. *Heat* throws down albumen, and the phosphates when they are in excess, but dissolves the urates of *soda and ammonia*. *Nitric acid.*—This acid

throws down a dead-white precipitate of albumen; it precipitates uric acid after the lapse of some hours, and dissolves it with effervescence; it also dissolves the oxalate of lime and the alkaline and earthy phosphates; it precipitates the colouring matter of bile of a green colour, but if added in excess, it changes it quickly to a dingy red, and afterwards to a brown; it also detects urea in excess, when added to an equal quantity of urine, by the formation of crystals of nitrate of urea. Moreover, it produces a cloudiness in urine containing certain essential oils. *Hydrochloric acid* precipitates uric and hippuric acid and the colouring matter of the bile. It throws down the latter of a green colour, whatever quantity may be added. It also dissolves the oxalate of lime, cystine, and the phosphates. *Acetic acid* produces a cloudiness in urine containing mucus; it dissolves the alkaline phosphates, and the phosphate of lime sparingly. *Sulphuric acid*, added to warm urine containing sugar or albumen, causes a deposit of carbon. *Caustic ammonia* throws down the earthy phosphates as a white precipitate, and dissolves cystine; its vapour imparts a rich purple hue to the crystals of uric acid. The *oxalate of ammonia* is used to detect the presence of the phosphate of lime. *Caustic potash* dissolves uric acid and the urates of soda and ammonia. With the aid of heat it disengages ammonia from the urate of ammonia; it also changes saccharine urine to a dark-brown colour, and thickens purulent deposits. A *solution of sulphate of copper*, previously rendered strongly alkaline by caustic potash, when heated with saccharine urine, detects the presence of sugar by causing a deposit of the red oxide of copper. *Alcohol*, by the aid of heat, dissolves cholesterine, and hippuric acid. *Oxalic acid in solution* throws down a characteristic oxalate of urea.

The following are the chemical and microscopical characters of the principal constituents of the urine in health and disease.

631. *Urea.*—This principle in excess gives a high specific gravity to the urine (1·030—1·035). If abundant, it may be detected by adding to a small quantity of urine in a watch-glass an equal bulk of strong nitric acid. If this is kept in a cool place, crystals of nitrate of urea are formed. If, however, the quantity of urea is small, we must evaporate before applying the nitric acid.

Fig. 12.



The best process for detecting urea and obtaining well-formed crystals of nitrate of urea is the following: Evaporate a portion of urine in a water-bath to the consistence of a syrup; add strong alcohol, filter the alcoholic solution, and evaporate it in the water-bath nearly to dryness; add a few drops of water and of strong nitric acid. Crystals of nitrate of urea are speedily formed, which assume, under the microscope, the *form depicted* in fig. 12. For practical purposes the presence of urea

may be readily detected by evaporating a few drops of urine on a fragment of glass, and adding an equal quantity of nitric acid.

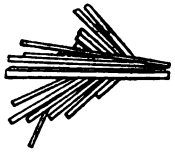
If we substitute oxalic acid for nitric acid, we obtain crystals of the microscopic form annexed:—

Fig. 13.



The alcoholic extract of urea leaves, on spontaneous evaporation, acicular crystals of the following form:—

Fig. 14.



632. *Uric Acid.*—Uric or lithic acid sometimes exists in the urine in such quantity as to separate from it, on cooling, in the form of a crystalline deposit. It is very rarely voided as gravel; but it is a frequent constituent of urinary calculi. Uric acid, as existing in urinary deposits, has every tint from light yellow to deep orange-red, or dark brown; and occasionally it is quite free from colour. Hence the familiar names of "yellow and red sand."

Urine which yields uric acid deposits has generally a higher colour than natural, an acid reaction, and a specific gravity of 1·020 or more. Uric acid may be separated from urine which yields no deposit on cooling, by adding hydrochloric acid in the proportion of two or three drachms to six or eight ounces of urine. The mixture, on being allowed to stand in a covered vessel for twenty-four to forty-eight hours, yields a red or reddish-brown sediment of uric acid.

The crystals also vary in size from grains visible to the naked eye, and known as *Cayenne pepper grains*, to a fine granular deposit, in which the characteristic forms of the crystal are only to be detected under high powers of the microscope.

Uric acid has the following chemical characters. It is insoluble in hot and cold water; it is not redissolved when the urine is heated; it is very soluble in caustic potash, and precipitated granular and colourless from this menstruum by the addition of an acid in excess; it is dissolved by nitric acid with effervescence, and on evaporation to dryness yields a red or pink residue, which is changed to a rich purple (murexide) when exposed to the vapour of ammonia. Heated on

platinum-foil the uric acid burns, giving out an odour of bitter almonds, and leaving a scanty white ash.

Under the microscope uric acid displays a great variety of forms. The proper shape of the crystal is rhomboidal; but it may assume one or other of the annexed forms, some of which are of comparatively

Fig. 15.



rare occurrence. (One of the figures represents the uric acid crystallized on a hair.)

633. *Hippuric Acid.*—This, which is an abundant constituent of the urine of herbivorous animals, also exists in human urine. It may be obtained by evaporating a few ounces of urine to the consistence of a syrup, and adding hydrochloric acid in excess. A mixture of uric and hippuric acids is thrown down. This deposit, having been washed in cold water, is to be boiled with alcohol. The hippuric acid will be dissolved, and, on evaporating the spirituous solution, is deposited in the form represented in the annexed engraving.

Fig. 16.



634. The *Urates* or *Lithates.*—These deposits are often found in the urine in considerable quantity, being generally thrown down as the urine cools, but occasionally they are contained in the urine as it is voided. These deposits are rarely free from colour, and they may assume any tint from light yellow to dark brown. Sometimes they are quite white, sometimes bright red. They are soluble in warm water or in warm urine, and in alkalies. An excess of acid throws down crystals of uric acid, and when treated first with nitric acid and then with ammonia, yield the rich purple murexide.

Fig. 17.



635. *Urate of Ammonia.*—This salt is sometimes found diffused through the urine, so as to give it the ropy appearance commonly due to muco-pus; in other instances it exists as a whitish deposit; in others, again, as a reddish-brown deposit, familiarly known as the *lateritious* or *brick-dust* sediment.

Urate of ammonia shares with the other urates the properties just enumerated; but it possesses the characteristic property of giving out ammonia, when

heated with liquor potassæ. Under the microscope, urate of ammonia has the appearance depicted in Fig. 17. The granular deposit known as urate of ammonia often consists of the mixed urates of soda, ammonia, lime, and magnesia.

636. *Urate of Soda*—Is of comparatively rare occurrence as an unmixed deposit, but it is sometimes met with in gout, and in fever patients treated with carbonate of soda.

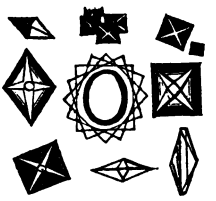
Fig. 18.



Urate of soda has the chemical properties common to the urates. It gives a yellow colour to the outer flame of the blowpipe. Under the microscope it presents the characteristic form seen at *a*, Fig. 18; *b* displays a rare variety, depicted by Dr. Beale.

637. *Oxalate of Lime.*—This is rarely seen as a granular deposit, but frequently exists in the urine, diffused through it in the form of minute octohedral crystals, which are visible under the microscope. It is a common constituent of urinary calculi, and the material of the so-called mulberry calculus. It may be recognised by its insolubility in water, liquor potassæ, and acetic acid; but it is soluble in nitric acid, and is converted at a red heat into *carbonate of lime*, which is identified by dissolving with effervescence in acids.

Fig. 19.



Oxalate of lime may be obtained from the urine for the purpose of chemical or microscopic examination in the following manner. One or two ounces of the urine are allowed to stand for a few hours in a conical wine-glass with a thin stem. A portion of the lower stratum is then withdrawn by the pipette, placed in a watch-glass, and gently heated. Crystals of the oxalate of lime are deposited, which may be collected at the bottom of the glass by carefully rotating the fluid. After allowing it to remain at rest for a few minutes, the fluid portion may be withdrawn by the pipette, its place being supplied by distilled water. The white glistening powder, again collected in the centre of the glass by gently rotating it, may be transferred by the aid of the pipette to the field of the microscope.

The crystals of oxalate of lime so obtained generally appear under the microscope as flattened octahedra, with one short axis and two longer ones. The appearance of the crystals varies accordingly with the position which they happen to assume. The oxalate of lime, or, as it is sometimes termed, the oxalurite of lime, may also assume the form known as the *dumb-bell crystal*. Crystals of this shape are believed to be generally, if not always, formed in the kidney itself,

Fig. 20.



and they differ from the octahedra in one or two particulars. They polarise light, and are perceptibly acted upon by acetic acid, which destroys their polarising power. The dumb-bell, in its more or less perfect form, is depicted in the annexed engraving. Both the octahedra and the dumb-bells are found adhering to casts of the urinary tubes. Octahedra so adhering are shown in Fig. 35.

638. *The Phosphates.*—Phosphoric acid exists in urine in combination with alkaline and earthy bases. We may be required to examine :—

(1.) The ammonio-phosphate of magnesia, or the triple phosphate.

(2.) The ammonio-phosphate of magnesia, with excess of ammonia, known as the basic or bibasic phosphate.

(3.) Phosphate of lime.

639. These deposits have the following properties in common. They generally occur in neutral or slightly-alkaline urine; are white unless tinged with blood; are not dissolved by heating the urine which contains them, but are, on the contrary, thrown down by heat; they are soluble in weak acids, but insoluble in water, in ammonia, and in liquor potassæ. The phosphate of lime is less soluble in acids. Heated separately they fuse with great difficulty; but when combined in nearly equal proportions, the phosphate of lime and the triple phosphate fuse readily, constituting the fusible calculus.

(1.) *The ammonio-magnesian phosphate, or triple phosphate.*—On adding a few drops of ammonia to healthy urine, the urine becomes turbid, and deposits the triple salt in combination with phosphate of lime. The same result may happen from the development of ammonia or its carbonate when the urine is retained in the bladder for a long time, as in cases of paraplegia, or allowed to stand some hours out of the body. It is also of common occurrence in diseased states of the mucous membrane of the bladder. The triple phosphate may present itself in any of the following forms:—*a.* As a white crystalline gravel. *b.* As a thin iridescent film on the surface of the urine. *c.* As a dense white deposit closely resembling mucus. *d.* In masses or ropes resembling puriform mucus. Under the microscope the triple phosphate presents itself in some of the annexed forms. It is very commonly seen as triangular or four-sided prisms with truncated ends. (Fig. 21.)

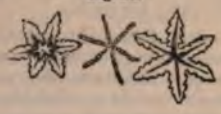
Fig. 21.



(2.) *The basic or bibasic phosphate* (the triple phosphate, with

excess of ammonia) has the microscopic characters shown in the annexed engraving. (Fig. 22.)

Fig. 22.



(3.) *The phosphate of lime* occurs as an amorphous deposit, or in little rounded particles, usually found adhering to the crystals of the triple phosphate.

640. *Cystine.*—This curious substance, which is characterised by the great excess of sulphur that enters into its composition, is not a constituent of healthy urine, and is a rare product of disease. It constitutes a form of urinary calculus, but very seldom exists as a deposit. The urine which contains cystine is usually of a pale-yellow colour, of low specific gravity, and of an odour resembling sweet-briar. The deposit of cystine is white, or of a pale-fawn colour, distinguished from white urate of ammonia by not disappearing on the application of heat to the urine which contains it, and from the earthy phosphates by its insolubility in dilute hydrochloric or strong acetic acid. It is at once distinguished from all other deposits by its ready solubility in ammonia. The form of the crystals is that of hexagonal plates of variable thickness, but generally thin, and often found superimposed, as in Fig. 23. The ammoniacal solution, on being allowed to evaporate, yields the same well-formed hexagonal plates or prisms, but sometimes the clustered crystals figured in the engraving.

Fig. 23.



Fig. 24.



The simple hexagonal form of cystine resembles that of common salt, which sometimes forms a crystalline deposit on the evaporation of the urine. The crystals of common salt, on hasty evaporation, wear the irregular cruciform appearance depicted in Fig. 24.

Cystine is often found blended with uric acid and the urates.

641. *Chyle.*—The term chylous urine is applied to urine which, on cooling, gelatinises spontaneously, assuming the appearance and consistence of *blanc-mange*. It contains a large quantity of albumen and fat, and is sufficiently distinguished by its spontaneous coagulation.

642. *Fat.*—Urine may contain fat either as a separate element, or as a constituent of chyle or milk. It is also of frequent occurrence in the shape of oil-globules attached to epithelial cells, or casts of tubes. (See § 402, Fig. 8 *b*, and § 658, Fig. 33.) The quantity of fat may be ascertained by evaporating a measured portion of the urine, dissolving

repeatedly with ether, evaporating the ether by a gentle heat, and weighing the residue.

643. *Milk.*—Urine containing milk is turbid, of a yellowish-white colour, and contains fat vesicles, which may be seen under the microscope. Milky urine does not coagulate by heat, unless the quantity of lactic acid be considerable, or unless it also contain albumen. On adding to a small quantity of the urine moderately warmed a few drops of acetic, dilute sulphuric, or hydrochloric acid, flocculi of coagulated casein are formed. The quantity of casein may be determined by collecting these flocculi, washing and drying them, and then dissolving out the oil-globules by ether.

644. *Sugar.*—The presence of sugar may be sometimes detected by the taste, especially if we first evaporate the urine to the consistence of a syrup; but this test is inconvenient in practice, and not to be depended upon.

The specific gravity of the urine is the test commonly employed at the bedside. This affords certain evidence of the existence of sugar only when it exceeds 1·035, which is probably about the highest specific gravity of urine containing urea in excess. The specific gravity of diabetic urine ranges from 1·020 to 1·050. Hence, when the symptoms lead to a suspicion of the presence of sugar, a specific gravity above 1·020, though a little below the average in health, would lead us to apply some of the following tests:—

(1.) *Trommer's Test.*—Add enough solution of sulphate of copper to give the urine a faint blue tint; then add liquor potassæ in excess. A precipitate of hydrated oxide of copper is formed, which dissolves in the excess of alkali. On boiling the liquid, the red suboxide of copper is thrown down if sugar be present.

(2.) *Fehling's Test solution.*—This may be conveniently substituted for the sulphate of copper and caustic potass used in Trommer's test. The solution is prepared by dissolving 69 grains of sulphate of copper in five times its weight of distilled water, and adding a concentrated solution of 268 grains of tartrate of potash, and then a solution of 80 grains of caustic soda in one ounce of distilled water.

The following tests have been recommended, but are less free from objection than the foregoing:—

(3.) *Moore's Test,* with *liquor potassæ.*—Pour a small quantity of the urine supposed to contain sugar into a test-tube, add to it about half its bulk of liquor potassæ, and boil for one or two minutes by the heat of a spirit-lamp. The urine will assume an orange-brown tint of a depth proportioned to the quantity of sugar.

(4.) *Runge's Test,* with *dilute sulphuric acid.*—Evaporate a small quantity of the urine on a surface of white porcelain, add to the warm liquid a few drops of dilute sulphuric acid (one part of the acid to six of water). If sugar be present the spot becomes deep brown or black, from the deposition of carbon. This is a delicate test, but not conclusive, as albumen will yield a similar result.

(5.) *Capezzuoli's Test,* with *hydrated oxide of copper* and *liquor*

potassæ.—Drop into the urine a few grains of the blue hydrated oxide of copper, and then add a small quantity of liquor potassæ, so as to render the liquid alkaline. If sugar be present the fluid becomes of a reddish colour, and in a few hours the fragments of the oxide become yellow, first at the edges, and then through the whole mass: this arises from the reduction of the oxide to the form of suboxide.

(6.) *Horsley's Test, with chromate of potass*.—Add to the urine an alkaline solution of chromate of potass, and boil. The liquid will assume a deep sap-green colour, due to the reduction of the oxide of chromium. The alkaline solution to consist of neutral chromate of potass and liquor potassæ in equal proportions.

(7.) *Crystallization Test*.—Evaporate the urine to the consistence of a thick syrup, and digest the residue in hot alcohol. Pour the cooled alcoholic solution into a large test-tube, and allow it to evaporate spontaneously. The sugar will crystallize on the sides of the glass in white granules.

(8.) *Fermentation Test*.—On adding yeast to diabetic urine, and raising the temperature to 80°, effervescence takes place, a brisk discharge of gas ensues, and a yellowish liquid is formed, which has the odour of beer, and yields an alcoholic liquid by distillation. One part of sugar in 1,000 parts of healthy urine of the density 1,030 may be detected by this means. The test was first suggested for animal fluids by Gmelin, and for urine by Dr. Christison.

(9.) *Torula Test*.—Expose the urine for a few hours to a temperature above 70°. A drop of the urine taken from the scum which covers the surface, and placed under the microscope, exhibits oval vesicles, which rapidly grow into a species of conferva, to which the term *torula* has been given. This formation, however, is not peculiar to diabetic urine. (Fig. 25.)

Fig. 25.



645. The quantity of sugar may be readily determined with a fair approach to accuracy, by the fermentation test, as suggested by Dr. Christison: "Every cubic inch of carbonic acid gas given off by fermentation, corresponds in round numbers with one grain of sugar, or forty-seven of gas to forty-five of sugar. Hence the quantity of sugar may be easily found by filling a graduated tube with mercury, leaving space for a little more than the requisite quantity of urine, which is then to be introduced; next filling up what remains of the space with yeast, and with the finger on the open end of the tube, reversing the tube in a vessel of mercury, and then placing the apparatus where it may be exposed to a heat of 70° or 80° for twelve or twenty-four hours."

646. *Bile*.—Urine containing bile is of a deep-brown colour, and if

the quantity be considerable, of a bitter taste. The bile may be detected by either of the following tests:—

(1.) *Nitric Acid Test.*—Place a small quantity of the urine on a white surface of porcelain, and add a drop of nitric acid. If bile be present, green and pink colours will show themselves round the test.

(2.) *Pettinkoffer's Test, Sulphuric Acid and Sugar.*—Place, as before, a few drops of the urine on a white surface of porcelain, and add to it a drop or two of strong sulphuric acid. While the mixture is hot add a drop of strong syrup. If bile be present a fine purple colour will be produced.

(3.) A third test has been proposed by Schwertfeger, which consists in throwing down the bile as a yellow precipitate, by acetate of lead, and dissolving the precipitate in alcohol acidulated with sulphuric acid. A green solution is obtained, to which Pettinkoffer's test may be applied.

Tests 1 and 2 are most expeditious, and, therefore, to be preferred.

647. *Kiestein.*—This, though not peculiar to pregnant women, is found in most cases of pregnancy. It consists of a film of fat, a peculiar matter resembling casein, and crystals of ammoniaco-magnesian phosphate. It forms upon the surface of the urine in periods varying from thirty hours to eight days, but most frequently on the third day. The urine is either neutral or ammoniacal at the time of its formation. After standing some time the pellicle breaks up and falls to the bottom of the vessel. The sediment has a disagreeable pungent odour of decayed cheese.

648. *Blood.*—Blood is sometimes voided with the urine in small defined clots, which are readily recognised on mere inspection; but, in other cases, it tinges the urine of a bright red, or of a brown or bistre red colour. The colour alone is not conclusive, as other colouring matters produce similar appearances. The nature of the colouring matter is, however, easily ascertained, either by the discovery of blood corpuscles under the microscope, or by the effect of heat and nitric acid, which throw down a dirty-brown coagulum, consisting of albumen blended with the colouring matter. The urine also becomes of a bright-red colour when treated with a concentrated solution of common salt.

Fig. 26.



Blood Corpuscles.—When not dissolved in the urine, the blood corpuscles form a dark brown-red sediment, in which their forms (see annexed engraving) may be discovered by the microscope.

649. *Fibrin.*—This substance is voided in the form of casts of the tubes as a constituent of clots of blood, or diffused through the urine in a state of solution. Coaguli and flocculi of fibrin are readily distinguished from mucus by their amorphous appearance under the microscope, and the absence of epithelial scales.

650. *Albumen.*—Tests—heat, and nitric acid. These should always be employed at the same time. For heat will throw down the phosphates if they are in excess, and the acid may render the urine turbid if it contain any essential oil, as that of cubebs or copaiba. Should the phosphates in excess coexist with an essential oil, both heat and nitric acid would throw down a white precipitate. The addition of an acid will dissolve the phosphates; the essential oil may be separated by ether, after which the urine will have its usual reaction. Corrosive sublimate in solution is also a delicate test for albumen, but the two tests just mentioned are those commonly employed.

651. *Mucus.*—A small quantity of mucus is present in healthy urine, but does not affect its transparency. In disease it may be blended with it in any proportion, from a slight cloud to a quantity sufficient to cause it to pour from one vessel to another as a viscid ropy fluid; and when the quantity of mucus is considerable, and the result of acute inflammation of the mucous membrane of the bladder, and especially when it is blended with an excess of phosphates, it may form a distinct deposit closely resembling pus. Urine containing mucus has generally an alkaline reaction, and is not coagulated by heat or nitric acid, unless albumen be also present. Acetic acid coagulates it.

652. *Pus.*—Urine containing pus is commonly either acid or neutral: and, on standing, deposits the pus as a distinct cream-coloured layer, which may be readily diffused through the fluid by agitation. The deposit is not dissolved by acetic acid, but is rendered more consistent by liquor potassæ, and when shaken with ether, yields a quantity of fat. The urine, freed from its purulent deposit, is coagulated by heat and nitric acid. In alkaline urine, pus assumes something of the viscidity of mucus.

Fig. 27.



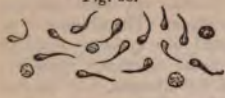
Under the microscope pus presents a number of opaque spherical granular globules, consisting of a cell-membrane enclosing nuclei, oil-globules, and minute granules. The addition of acetic acid renders the envelope transparent and the nuclei more distinct, as in the subjoined engraving (Fig. 27), in which *a* represents the ordinary appearance of the pus granule, and *b* of the same granule on the addition of acetic acid. Mucus presents similar microscopic appearances, but the particles are not so distinctly granular.

653. *Diagnosis of Pus and Mucus.*—Much stress was formerly laid on the importance of distinguishing between pus and mucus, and many methods were devised for effecting that object. It is now well understood that though there is great difference between healthy mucus and pus, there is very little difference between pus and mucus thrown out by an inflamed membrane. The only satisfactory means of distinction which we possess is the application of heat or nitric acid to the urine containing the pus or mucus respectively. Urine containing pus is coagulated by these reagents, while urine containing

mucus is not, unless it also contain albumen derived from some other source.

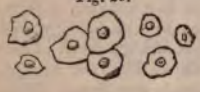
654. *Semen.*—Occasionally the seminal fluid which lines the urethra after emission becomes washed away by the urine, and may be recognised in it by the peculiar appearance of the spermatozoa. (Fig. 28.) The examination should be made soon after the urine is passed; a quarter or an eighth power should be used, and the object should not be too strongly illuminated.

Fig. 28.



655. *Epithelium.*—The epithelium scales which are found blended with pus and mucus, and are often discharged in large quantities, especially by persons suffering from the secretion of oxalate of lime, are easily recognised by their well-known microscopic characters. (Fig. 29.)

Fig. 29.



656. It is sometimes important to be able to form an opinion on the spot, by inspection and the application of one or two simple tests, as to the character and composition of an urinary deposit. The deposits which we are most likely to encounter may be classed as follows:—

(1.) Red crystalline sediment—Uric acid with colouring matter of the urine.

(2.) White crystalline sediment—Triple or ammoniaco-magnesian phosphate.

(3.) White amorphous sediment—Triple phosphate, and phosphate of lime.

(4.) Pink sediments—Urate and phosphate of ammonia.

(5.) Yellowish or nut-brown sediment—Urate of ammonia and soda, earthy phosphates, and colouring matter of urine.

(6.) Reddish-brown or lateritious sediment—Alkaline urate (chiefly urate of soda), earthy phosphates (occasionally), colouring matter of urine, and alkaline purpurate.

(7.) Oxalate of lime. Rare as a deposit.

(8.) Carbonate of lime } Very rare.
(9.) Cystic oxide }

(10.) Red particles of the blood, pus, mucus, &c.

657. The substances contained in 2, 3, 4, 5, and 6, consist of a mixture of colouring matter with alkaline urates and the earthy phosphates in variable proportions. These are easily distinguished, both from each other and from certain secretions which may resemble them. This is done by shaking the sediment up in the urine, and applying heat to the turbid fluid. If the sediment dissolves, it consists of the alkaline urates, and chiefly of urate of ammonia; if, on the other hand, the fluid remains turbid, the deposit consists of the earthy phosphates, or of organic matter in the form of pus or mucus. These may be readily distinguished by the addition of hydrochloric acid, which

dissolves the phosphates, but not the organic matters. If urine containing urates also holds albumen in solution, the urine first becomes clear, and then turbid on the application of heat.

658. *Casts of the Urinary Tubes.*—In cases of disease of the kidney considerable importance attaches to a microscopic examination of the urine, with a view especially to the discovery of casts of the urinary tubes.*

All the forms of renal disease which have not a purely local origin, such as mechanical injury from a blow on the loins, the irritation of a calculus, or retention of urine in consequence of stricture, are the result of an effort made by the kidney to separate from the blood some morbid and noxious material. Amongst the most common causes of renal disease are the fever poisons, particularly that of scarlatina, and more rarely that of measles, of erysipelas, or of typhus. A morbid condition of blood connected with gout is another frequent cause of chronic renal disease; in other cases imperfect nutrition of the blood consequent on an insufficient supply of animal food, and sometimes an imperfect action of other excretory organs, such as the skin or liver, will excite disease in the secretory structure of the kidney. One form of disease may sometimes be traced to the scrofulous diathesis. Lastly, a temporary disease of the kidney is sometimes produced by some irritant accidentally introduced into the blood, such as oil of turpentine or cantharides. In all these cases the morbid products are thrown into the tubes of the kidney, and portions of them being continually dislodged by the urine flowing through the tubes, appear in the secretion in the form of cylindrical casts. As each form of disease in the kidney is attended by a peculiar and characteristic cast, it follows that a careful examination of these bodies is essential to the formation of an exact diagnosis in cases of renal disease. It is not sufficient to detect albumen in the urine, but the secretion must be examined microscopically before an opinion as to the nature of the disease and its probable result can, with any confidence, be given. The casts of which the chief varieties are represented in the figures, may best be examined with a magnifying prism of about 200 diameters.

Fig. 30.



Fig. 30. An *epithelial cast*, composed of fibrin, entangling epithelium and blood corpuscles. This form of cast indicates the existence of "acute desquamative nephritis," a form of disease which occurs not uncommonly as a consequence of scarlatina. This desquamation of epithelium from the inner surface of the kidney tubes, is analogous to

* I embrace this opportunity of acknowledging my obligations to Dr. George Johnson for the following summary of his views, and of recommending a careful perusal of his work on Diseases of the Kidney.

the desquamation of epidermis from the skin, which occurs more constantly and naturally as one of the consequences of the fever.

Fig. 31.



Fig. 31.—A *granular cast*, characteristic of "chronic desquamative nephritis." These casts are composed of fibrin, with particles of disintegrated epithelium; they commonly exist in the urine of those who have had numerous attacks of gout, and they may often be detected long before any other sign of renal disease. Albumen appears at a later stage.

Fig. 32.

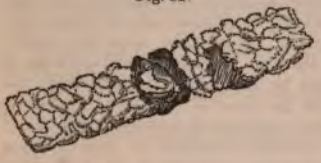


Fig. 32 represents a peculiar form of casts which from their appearance may be called *waxy*. This material is sometimes deposited in the tubes in the advanced stage of chronic nephritis, but it sometimes occurs in an acute form as a primary disease of the kidney.

Fig. 33



Fig. 33 represents casts composed of fibrin, entangling oil-globules and epithelial cells gorged with oil. They may be called *oily casts*, and they indicate the existence of fatty degeneration of the kidney, the most serious and incurable form of Bright's disease.

Fig. 34.



Fig. 34 represents *purulent casts*, that is to say, casts of fibrin entangling pus cells, from the urine of a man who had suppurative nephritis; a very serious and often fatally rapid form of disease.

Fig. 35.—*Blood casts*, from the urine of a man who had strangury and hæmaturia, after taking oil of turpentine. The blood having been moulded in the kidney tubes, of course affords unequivocal evidence that the hæmorrhage was renal and not vesical. The crystals attached to the cast are oxalate of lime.

Fig. 35.



659. In cases of diabetes, and in other morbid states in which the urine is loaded with matter in excess or foreign to its normal composition, it is desirable to be able to estimate the quantity of solid matter which the urine contains. This may be done by multiplying the excess of the specific gravity of the urine above that of water by the weight of the urine, and the product by 0·00233. If the weight of given quantities of urine of different specific gravities be known, the amount of solids may be directly calculated from the measured quantity, and in this way we may determine the solid matter passed in twenty-four hours, provided the urine submitted to examination be an average of that passed during the entire period. To obviate the necessity for calculation, two tables are given, of which the first presents the quantity of solid matter contained in 1000 grains of urine of different densities; and the second, the weight of one pint of urine. The mode of using the tables will be readily seen from a single example. Suppose a patient to pass, in twenty-four hours, three pints of urine of the specific gravity of 1·030, it is required to ascertain the weight of solid matter voided in this period. 1000 grains of urine, specific gravity 1·030, contain by Table I. 69·90 grains of solid matter, and a pint of urine of the same specific gravity weighs, by Table II., 9012 grains. Hence $\frac{69{\cdot}9 \times 9012}{1000}$ or 629·9 grains is the quantity of solid matter contained in each pint of urine; and $629{\cdot}9 \times 3$, or 1889·7 grains, is the total weight of solids voided in the twenty-four hours. This calculation will give a sufficiently near approximation to the actual weight of saccharine matter in cases of diabetes mellitus.

TABLE I.

Solids in 1000 *Grains of Urine of different densities.*

Specific Gravity.	Solids.	Specific Gravity.	Solids.
1·001 -	2·33	1·010 -	23·30
1·002 -	4·66	1·011 -	25·63
1·003 -	6·99	1·012 -	27·96
1·004 -	9·32	1·013 -	30·29
1·005 -	11·65	1·014 -	32·62
1·006 -	13·98	1·015 -	34·95
1·007 -	16·31	1·016 -	37·28
1·008 -	18·64	1·017 -	39·61
1·009 -	20·97	1·018 -	41·94

Specific Gravity.	Solids.	Specific Gravity.	Solids.
1·019	44·27	1·035	81·55
1·020	46·60	1·036	83·88
1·021	48·93	1·037	86·21
1·022	51·26	1·038	88·54
1·023	53·59	1·039	90·87
1·024	55·92	1·040	93·20
1·025	58·25	1·041	95·53
1·026	60·58	1·042	97·86
1·027	62·91	1·043	100·19
1·028	65·24	1·044	102·52
1·029	67·57	1·045	104·85
1·030	69·90	1·046	107·18
1·031	72·23	1·047	109·51
1·032	74·56	1·048	111·84
1·033	76·89	1·049	114·17
1·034	79·22	1·050	116·50

TABLE II.

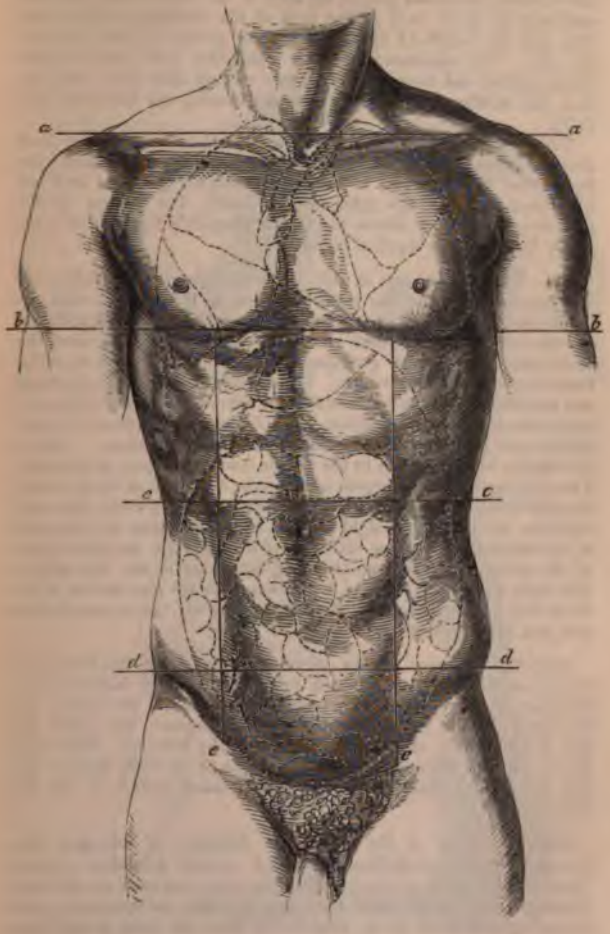
Weight of a Pint of Urine of different densities.

Specific Gravity.	Weight of one Pint.	Specific Gravity.	Weight of one Pint.
1·010	8837	1·031	9021
1·011	8846	1·032	9030
1·012	8855	1·033	9038
1·013	8863	1·034	9047
1·014	8872	1·035	9056
1·015	8881	1·036	9064
1·016	8890	1·037	9073
1·017	8898	1·038	9082
1·018	8907	1·039	9091
1·019	8916	1·040	9099
1·020	8925	1·041	9108
1·021	8933	1·042	9117
1·022	8942	1·043	9126
1·023	8951	1·044	9134
1·024	8960	1·045	9143
1·025	8968	1·046	9152
1·026	8977	1·047	9160
1·027	8986	1·048	9169
1·028	8995	1·049	9178
1·029	9003	1·050	9187
1·030	9012		

2. The Abdomen and Organs of Digestion.

660. *The Abdomen.* — To facilitate description, the chest and abdomen have been divided into a number of distinct parts or regions by imaginary lines drawn from fixed points. (See figures, pp. 157, 159.)

Fig. 36.



This division is effected, in the first place, by four horizontal lines extending round the trunk of the body—the first (*a a*) at the level of the clavicles, the second (*b b*) at the level of the point of the ensiform cartilage, the third (*c c*) at the level of the cartilages of the tenth ribs, and the fourth (*d d*) at the highest points of the crests of the ilia. The abdomen is further subdivided into seven regions (three central and four lateral) by two vertical lines (*e e*) springing from the middle point of the groin, and meeting the horizontal line (*b b*).

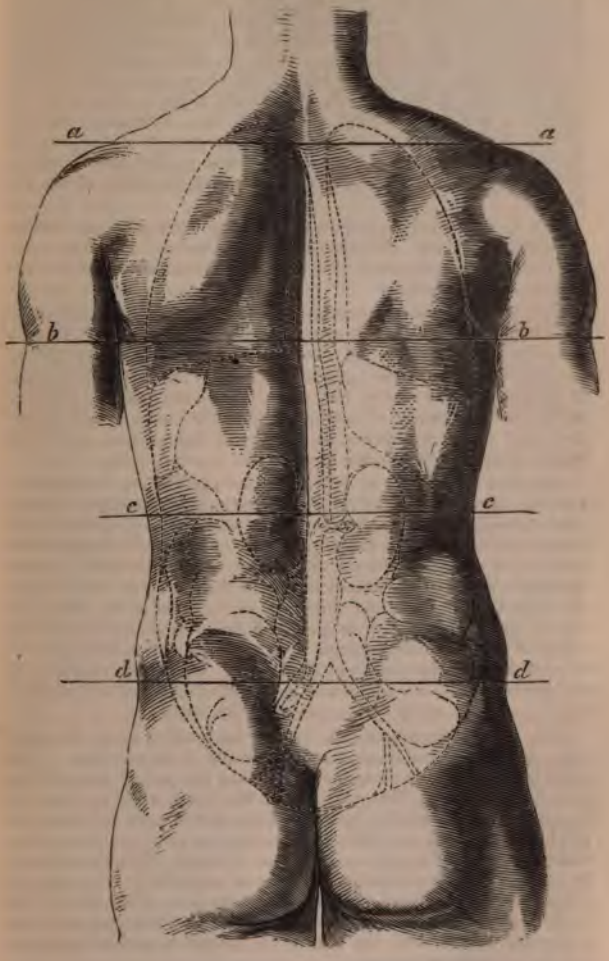
The three central regions thus formed are named in the order from above to below, the epigastric, the umbilical, and the hypogastric; the four lateral regions, taken in the same order, are the right and left hypochondriac, and the right and left iliac. The portion of the abdomen immediately above the line of Poupart's ligament is commonly known as the inguinal region.

661. The organs situate in each of these regions are as follow:—The *epigastric* contains the middle portion of the stomach with its pyloric extremity, the left lobe of the liver, the lobulus spigelii and hepatic vessels, and the head of the pancreas; and behind these, the cœliac axis, the semilunar ganglion, and part of the vena cava, aorta, vena azygos, and thoracic duct. The *umbilical* contains the omentum and mesentery, the transverse portions of the duodenum and colon, and some convolutions of the jejunum. The *hypogastric* is occupied by the bladder and a portion of the omentum and small intestines. Behind the bladder lies the uterus in the female, and the rectum in the male. The *right hypochondriac* region contains the right lobe of the liver and the gall-bladder, part of the duodenum and ascending colon, the renal capsules, and part of the right kidney; the *left* contains the large end of the stomach, the narrow extremity of the pancreas, the spleen, part of the colon, the renal capsules, and upper part of the left kidney. The *right iliac* region contains the cæcum, with the termination of the ileum and the commencement of the colon; the *left*, the sigmoid flexure and part of the descending colon.

662. The posterior regions, formed by continuing the horizontal lines just described, are divided by a vertical line following the direction of the spine into four regions, the right and left dorsal, and the right and left lumbar. Of these four regions, the *right and left dorsal* contain the upper portions of the kidneys. The *right lumbar* contains the cæcum and lower portion of the right kidney; the *left*, the sigmoid flexure of the colon, and lower portion of the left kidney.

663. When any of the organs are distended or enlarged, they encroach upon surrounding parts, and occupy adjoining regions. Thus, the distended stomach or bladder may encroach on the umbilical region; the distended colon may rise into the epigastric; and the enlarged liver or spleen may descend into the right or left iliac region.

Fig. 37.



664. The *size and shape* of the abdomen vary with age and sex. In the child the abdomen is large; in the spare adult, small; in the female it is naturally pendant, presenting an enlargement in the hypogastric region. In persons of sanguine and nervous temperaments it is small; in the phlegmatic, and in the melancholic, it is more commonly large. It varies in size, in the same person, with the full or empty state of the stomach, the quantity of gas contained in the intestines, and the distension of the bladder. Pregnancy, ascites, ovarian dropsy, tympanites, hydatids, enlargement of the liver or spleen, and various morbid growths attached to the several organs, may also greatly increase the size and alter the shape of the abdomen.

665. In examining the abdomen, we employ three principal methods —*inspection*, *manual examination*, and *percussion*. In certain cases we resort to measurement, and in a few instances we employ the method of auscultation.

666. By *inspection*, we ascertain the size, form, and movements of the abdomen. The size is increased by any of the causes just specified; the form, too, is altered, either throughout the entire cavity, or in parts, according as the cause is extensive or limited. The history of changes of form is very important. Thus, the gradual, uniform, and central enlargement of pregnancy, the lateral enlargement in the first stage of ovarian dropsy, and the equal and gradual growth of ascites, form important means of diagnosis.

667. The movements of the abdominal parietes are not less important, especially those of respiration. Thus, in peritoneal inflammation, respiration is performed by the chest alone; and the same absence of motion in the abdomen is seen in severe rheumatic affections of its muscles. On the other hand, in pleuritis and in severe rheumatic affections of the muscles of the chest or of the diaphragm, the respiration is performed chiefly by the muscles of the abdomen. Again, when the abdomen is greatly distended from any cause, the action of the abdominal muscles is nearly suspended, and respiration is performed by the chest and diaphragm. When the distension is still greater, the viscera are pressed against the diaphragm, and respiration is performed solely by the muscles of the chest.

668. By the *touch*, we gain further information as to the size, form, shape, degree of tension, and movements of the abdomen. This is the best mode of counting the respirations, the patient being in the recumbent posture. The pulsations of the aorta, when the seat of aneurism, are also detected by this means; but it must be borne in mind that the aorta sometimes communicates its pulsation to tumours situate over it, and even to accumulations of fæces. We also ascertain by the touch its temperature and degree of sensibility. The *temperature* should be compared with that of other parts of the body. In acute peritonitis, and in severe febrile affections, accompanied with abdominal inflammation, the heat of the surface is greatly increased, and has a peculiar pungency.

669. In ascertaining the degree of *sensibility*, pressure should first be made gently, and with the open hand. If the slightest touch produces pain, and that pain is accompanied by inflammatory fever, the disease is in the peritoneum; but if fever is absent, the pain is neuralgic, and will often be found associated with a tender state of the spine. If a slight touch produces no pain, we apply stronger pressure. If deep and moderately strong pressure occasions rather a feeling of soreness than of acute pain, we may conclude that inflammation of the mucous membrane of the stomach or intestines is present. Direct pressure of this kind sometimes produces very slight pain even when the peritoneum is inflamed; in such cases, a lateral pressure, causing the peritoneum to slide over the intestines, occasions extreme pain. In colica pictonum, strong pressure relieves pain, and forms an important means of diagnosis. Muscular pain, also, is relieved by gentle pressure, gradually increased; but, on the sudden removal of the pressure, the muscles are thrown into action, and acute suffering is produced. But even during the application of the hand, pain may occur, from the sudden contraction of the muscles in the act of expiration. Hence the necessity of applying this diagnostic mark with some caution. Muscular pain, too, is rarely accompanied by much constitutional disturbance, and, like neuralgia of the skin, is often dependent on, or associated with, an irritable state of the spinal marrow.

670. In applying pressure to the abdomen, we should always mark the expression of the countenance, as this is much more to be depended on than the answers of the patient, especially in cases accompanied by typhoid symptoms, or when the brain is affected. When great tenderness exists in the abdomen, the patient is apt to throw the muscles into rigid tension, so as to shield the contents of the cavity from pressure. When the seat of the tenderness is the right hypochondriac region, and the cause disease of the liver, the right rectus muscle is generally found in a state of rigid contraction. When this rigid contraction exists either on one side or on both sides, we watch for an opportunity of applying pressure when the patient's attention is diverted, or while he is speaking.

671. If in examining the abdomen we discover any tumour, or are anxious to ascertain the state of any of its contents more accurately, it will be necessary to relax the muscles of the abdomen, by placing the patient on the back, with the head slightly raised and bent forward, the arms extended by the sides, the thighs bent nearly at right angles on the trunk, the knees apart and turned outwards, and the feet resting on the bed in contact with each other. When so placed, the patient must be desired to use as little muscular effort as possible, and the attention must be diverted from the examination which is going on. In this relaxed state of the abdominal parietes, the position of tumours, and the extent of the enlargement which the viscera may have undergone, are readily ascertained.

672. *Percussion* may be performed either directly with the points

of the fingers, or by the intervention of a plate of ivory or wood, or of a finger of the left hand. Applied in this latter manner over the site of the stomach, or over any portion of the small or large intestines containing air, percussion elicits a clear sound. In the epigastric region, in ordinary states of the stomach, and over any part of the intestines largely distended with air, the sound is tympanitic; the clear sound is somewhat modified, if the air be mixed with fluid. Percussion, on the other hand, elicits a dull sound when applied over any of the solid viscera, over collections of fluid, over the hollow viscera when entirely free from air, over the intestines when containing only fæces, over the enlarged liver or spleen, and over solid tumours formed within the cavity.

673. Percussion combined with touch may be employed in detecting the presence of fluid. This is best done in the upright posture. It consists simply in placing the palm of the hand on one side of the abdomen with a firm but gentle pressure, and tapping sharply with the other hand on the part of the abdomen directly opposite to it. If fluid be present, a peculiar vibrating shock is experienced, which is not easily mistaken.

674. Percussion with the points of the fingers is useful in distinguishing muscular pains of the abdomen. A slight touch throws the muscles into action, and produces pain. This sign, combined with the absence of pain on firm pressure gradually applied, and the recurrence of the pain on the sudden removal of the pressure, together with the acute pain produced by every movement of the affected muscles, and the absence of urgent constitutional symptoms, distinguishes muscular pains from those due to disease of deep-seated parts.

675. *Measurement* of the abdomen is rarely resorted to. A common tape measure graduated to eighths of an inch will answer the purpose. No particular precautions are necessary; but in recording the result it may be well to state whether the measure was taken during inspiration or expiration. When the abdomen is uniformly enlarged by any tumour or collection of fluid, the measurement is best taken at the umbilicus.

676. *Auscultation* is occasionally resorted to in examining the abdomen, to confirm, by means of the friction-sound, the diagnosis of inflammation of the peritoneum. This sound is caused by the rubbing together of two peritoneal surfaces roughened by deposits of lymph. By the application of the stethoscope, we may also hear the pulsations of the aorta in spare persons. The stethoscope is also used by the accoucheur, with a view to detect the uterine murmur, and the pulsations of the fœtal heart. The first is a blowing sound, synchronous with the pulse of the mother, and best heard in the iliac regions near the groins. The second is a double sound, not unlike the ticking of a watch, and occurring from about 120 to 160 times in a minute. This sound, which is best heard about the centre of the left iliac region, is rarely audible till about the end of the fifth month.

3. The Chest, and the Organs of Respiration and Circulation.

677. An examination of the external conformation of the chest must precede all inquiries into the diseases of parts contained within it. To facilitate such examination, the chest, like the abdomen, has been divided into regions, by lines drawn from fixed points. (See Figures, pp. 157 and 159.) The two horizontal lines (*a a* in the line of the clavicles, and *b b* on the level of the ensiform cartilage), joined by a vertical line bisecting the sternum, divide the chest anteriorly into two principal regions, of which certain parts are designated by characteristic names. The portions which lie beneath the clavicle are known as the subclavian regions, and the lower portions of the neck above the clavicles as the supra-clavicular regions. The part of the chest marked by the nipples is sometimes called the mammary region, and the armpit is known as the axillary region.

678. On the back part of the chest the scapular, intra-scapular, and infra-scapular, or superior dorsal regions, correspond—the first to the scapula of either side, the second to the space between the two scapulæ, and the third to that portion of the chest which is immediately below the angles of those bones.

679. The size, shape, and movements of the chest, may be ascertained by *inspection*, *manual examination*, and *measurement*.

680. *Inspection.*—A well-formed chest is large in all its dimensions, uniformly rounded, and free from all irregularity in the bony parietes. The spine should be straight, or, in very strong men, especially those who use the right arm much, curved almost imperceptibly towards the right side. The chest appears at first sight symmetrical; but when measured, the right side will be found larger than the left by about half an inch, and there is naturally somewhat more fulness above and immediately beneath the clavicle on the left than on the right side, occasioned by the left lung rising higher than the right. The chest is wider and longer in men than in women; but deeper in women than in men. Women are also more subject to distortions of the chest and spine.

681. The first glance at the chest enables us to form a judgment of its size. A more minute examination is necessary to detect deviations from its accustomed form. The chief distortions affecting both sides of the chest alike, are those arising from the use of stays in the female, and from constrained posture in the male. Of the latter, the most remarkable is the flattened chest of the shoemaker. Alterations in the shape of both sides of the chest also arise from diseases affecting equally both lungs; such as tubercles, leading to contraction, especially in the subclavian region, and dilatation of the pulmonary cells (emphysema), causing a considerable enlargement chiefly about the middle of the chest. Alterations in the shape of one side only, or of a limited portion of one side, may arise from more than one disease of the corresponding

lung. Pleuritis, both acute and chronic, causes an enlargement of the affected side, but in certain cases the same disease produces contraction. In hydrothorax, also, and in pneumothorax, the size of the affected side is increased. When the dilatation is extreme, the intercostal spaces are raised to a level with the ribs. More partial changes arise from circumscribed pleurisy and limited adhesions. In advanced cases of phthisis, the position of a cavity is often indicated by the falling in of one of the intercostal spaces. Certain changes in the size and shape of the chest also arise from diseases of the heart and of the large vessels.

682. Inspection also enables us to ascertain the character of the respiration; whether tranquil or hurried, easy or difficult; whether abdominal, as in acute pleurisy or acute pleurodyne, or thoracic, as in acute diseases of the abdomen, and severe rheumatic affections of the abdominal muscles or of the diaphragm. The character of the heart's impulse may also be ascertained by inspection of the chest.

683. *Manual Examination.*—By this, as by inspection, we ascertain the development of the muscles, the thickness of the parietes of the chest, the presence of obesity or emaciation, and of œdema or emphysema of the integuments. Heat and soreness of the skin, the existence of local tenderness, from whatever cause, or of muscular pain, may be ascertained by the same means. The extent and character of the heart's impulses may also be ascertained by the application of the hand, and it is usual to apply the two hands to corresponding parts of the chest when we wish to ascertain the comparative freedom of the respiration on the two sides.

The skin of the chest is preternaturally hot in pneumonia, and in all inflammatory affections of the lungs.

Firm pressure in the intercostal spaces often causes pain when the pleura is inflamed, either generally or partially. This partial tenderness occurs in phthisis pulmonalis, when the pleura covering a cavity is inflamed, or when a collection of pus is making its way externally.

684. The chest is a common seat of muscular pains. Sometimes these pains are idiopathic, as in pleurodyne, or they may be the consequence of violent efforts in coughing. Such pains are developed by slight percussion with the points of the fingers, by the movements of the arms or trunk, and by a deep inspiration. The absence of pain on firm and gradual pressure, with its recurrence when the support is suddenly removed, is also a good diagnostic mark of muscular pain. Percussion with the fingers throws the muscles visibly into action through the whole length of their fibres, and, in certain cases, causes remarkable partial and transverse contractions, which are best seen in emaciated persons, and especially in advanced cases of consumption. These partial contractions are not confined to the muscles of the chest, but may be excited in the biceps and in other large muscles.

685. *Measurement.*—An actual measurement of the chest may be

resorted to in order to ascertain the size of the entire chest or of certain portions of it, or with a view to determine the degree of expansion and enlargement which the entire chest, or parts of it, undergo during the act of inspiration. The progressive enlargement or diminution in the size of the chest, which accompanies certain forms of disease, may also be ascertained by repeated measurements made with great care, in the same position, and in the same condition of the cavity of the chest. These several measurements may be effected by means of a graduated tape stretched from one point of the chest to another. In measuring the size of the entire chest the tape should be carried horizontally round it, passing over the two nipples, or at an equal distance above or below them. When the amount of expansion due to the movements of inspiration is to be ascertained, one end of the tape should be firmly held over the spinous process of one of the vertebræ, and the other be allowed to slide freely through the other hand held over the centre of the sternum. The chest should

Fig. 38.



first be measured after a full expiration, and then after a deep inspiration: by shifting the tape we may measure the degree of expansion which both sides of the chest undergo. In making these measurements the fact already stated, viz., that the right side of the chest is naturally larger than the left by half an inch, must be borne in mind.

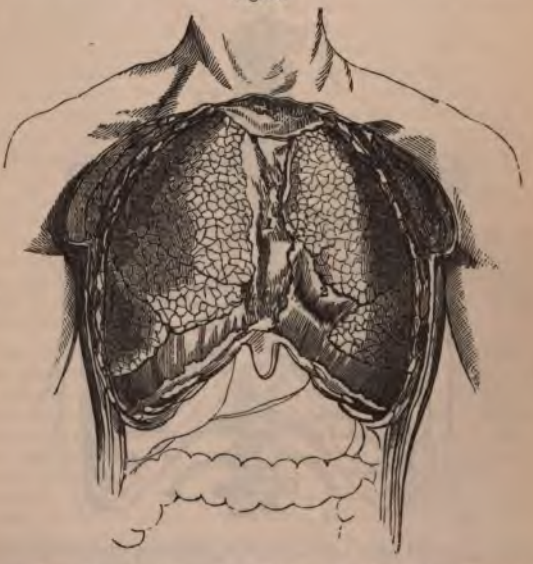
The expansion of the chest in ordinary inspiration does not exceed an inch and a half, and it is somewhat greater on the right than on the left side. The greatest circumference of the chest in robust men varies from 38 to 41 inches.

686. A stethometer, or instrument for measuring the magnitude of the inspirations, has been invented by Dr. Richard Quain. It consists of a string passing round the chest, adjusted in the act of expiration, and when the chest is expanded by inspiration, indicating the amount of the enlargement by a hand moving upon a dial-plate. Dr. Sibson employs a similar instrument, especially for measuring the movements of particular portions of the chest.

The Lungs.

687. The cavity of the chest (Fig. 38) consists of a hollow cone, of which the apex is cut off above by a horizontal plane, corresponding with the upper opening of the chest, and the base by an oblique plane,

Fig. 39.



looking forwards and downwards, and constituting the lower opening. The upper opening is filled by the trachea, œsophagus, and large blood-vessels: the lower opening is closed by the diaphragm. This conical

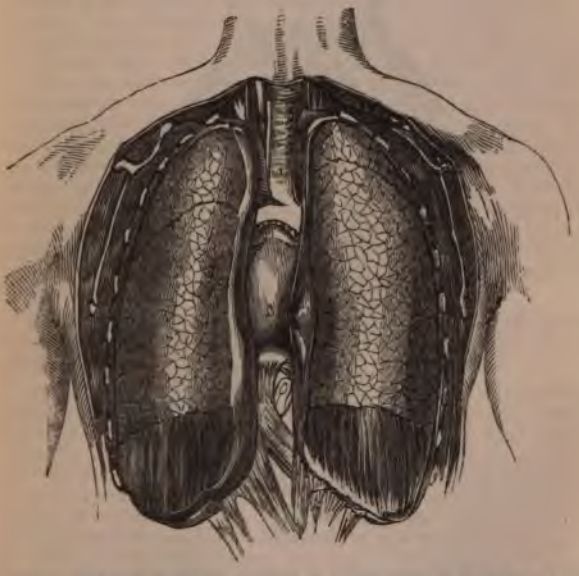
cavity is flattened before where the cartilages of the ribs are joined to the sternum, and behind where the ribs unite with the spine; but it is rounded at each side where it is formed by the ribs and their cartilages.

688. The principal parts contained within the cavity of the chest are the lungs and the heart, of which the former occupy by far the larger portion. The size of the chest corresponds closely with the size of the lungs, and is liable to various deformities, in consequence of diseases affecting those organs. But the size and shape of the chest are also altered in certain diseases of the heart and large vessels.

689. The lungs are in close contact with the walls of the chest in every part, with the exception of a small space (2, Fig. 39) to the left of the sternum, where the lungs leave a portion of the middle mediastinum containing the heart uncovered, and a narrow space (1) behind the sternum corresponding to the track of the large vessels.

690. Of the two lungs the right is the larger, but the left the

Fig. 40.



longer, its apex rising somewhat higher, and its base sinking lower. The right lung reaches to about the level of the sixth rib in front, of

the eighth rib at the side, and still lower behind. The left lung extends to the level of the seventh rib anteriorly, it reaches the eighth rib laterally, and descends still lower posteriorly. Both lungs applying themselves closely to the diaphragm, descend much lower behind than before, being there prolonged into thin lappets. The diaphragm separates them from the liver on the right side, from the stomach in the region of the epigastrium, and from the spleen and colon on the left side posteriorly. (Figs. 39, 40, and 41.)

691. The chest is subjected to several kinds of examination, having special reference to the condition and functions of the lungs. Our object in these examinations is—1. To ascertain the number and character of the respirations. 2. To determine the capacity of the lungs. 3. To find out the true condition of the texture of the lungs.

692. 1. *The Number and Character of the Respirations.*—We may count the respirations in one of two ways: by observing the motions

Fig. 41.



of the trunk or of some article of clothing which moves as it moves, or by placing the hand on the chest or abdomen. The first of these two methods is best adapted to the sitting or erect posture, the last

to the recumbent posture. The most convenient plan is to place the patient in the recumbent position, to cause the hand to rest on the abdomen, grasping the wrist at the same time as if feeling the pulse. In either case, whether counting the respirations by sight or by touch, the attention of the patient should be withdrawn from the breathing, as the muscles of respiration are partially under the control of the will. The character of the respirations, whether natural, slow or quick, easy or laboured, sighing, catching, or gasping, may also be ascertained in either of these ways.

693. In this place it may be well to observe that the character of the respiratory movements differs in the two sexes and at different ages. In very young children they are performed chiefly by the abdomen; in adults of both sexes mainly by the chest. In the male the lower part of the chest, in the female the upper part of the chest, is brought mostly into play. This difference is observable even in dyspnœa as it affects the two sexes.

694. In very tranquil breathing, inspiration is performed almost entirely by the descent of the diaphragm, marked by the gradual protrusion of the abdomen; and expiration by the contraction of the abdominal parietes. In ordinary respiration, however, the ribs are raised and tilted outwards during inspiration, to recover themselves by their own elastic reaction during expiration. In violent inspiration, other muscles besides the diaphragm and intercostals are called into play, especially those by which the scapulæ are raised and fixed. In violent expiration, as in coughing and sneezing, the abdominal muscles are brought into action, by which the viscera of the abdomen are compressed and the diaphragm forced upwards into the chest. Yawning and sighing are forms of deep inspiration; coughing and sneezing, of violent expiration. Deep inspirations relieve the circulation by leaving greater space for the admission of blood into the heart, whilst violent expirations are chiefly of use by freeing the lungs or air-passages of noxious and irritating substances.

695. Attempts have been made to assist the senses in counting the breathings, and in measuring the magnitude of the respirations by the amount of expansion taking place in the parietes of the chest.

696. As the instrument which I have made use of for counting the respirations has not yet been employed at the bedside, a very brief description of it will suffice. It is an adaptation of one form of the pedometer. It resembles a large watch with a dial-plate graduated to 10,000, and furnished with two hands, one of which is set in motion by a string attached to a short chain. The instrument is fastened over the pit of the stomach by a band passing round the abdomen, and the string is made tense in the act of expiration, so as to set the long hand in motion, by fastening the free end to any fixed point at a short distance from the body. Every act of inspiration accordingly, by bringing the two fixed points nearer together, relaxes the string, while every act of expiration tightens it and sets the hand in motion, causing

it to traverse one space on the dial-plate. The experiments, of which the results are given under the head of THE RESPIRATION, were performed by means of this instrument.

697. *The Capacity of the Lungs.*—Two plans have been proposed for ascertaining the capacity of the lungs; the one by Dr. Lyons, the other by the late Mr. Abernethy. The latter plan was employed by Mr. Thackrah, of Leeds, and, with some modification, was adopted by Dr. Pereira, and has lately been much improved by Dr. Hutchinson. A portable spirometer is also in use, invented by Mr. Coxeter.

698. Dr. Lyons' method consists in measuring the length of time required to empty the chest after a complete inspiration, by counting aloud. To render the expiration continuous and complete, the patient is required to count from 'one' upwards, as far as he can, slowly and audibly; and the number of seconds during which he is able to count is noted by a watch. The time occupied is a sort of measure of the capacity of the lungs. Dr. Lyons fixes the limit of time for perfectly healthy persons at thirty-five seconds: this is too low; for in more than one trial I have myself continued to count for forty seconds. In confirmed phthisis, Dr. Lyons says that the period of expiration never exceeds eight, and is frequently less than six seconds; whilst in pleurisy and pneumonia it may range from four to nine. This method of measurement, though open to obvious objections, admits of useful application.

699. Mr. Abernethy's method consists in making the patient take as deep an inspiration as possible, and then causing him to expire through a bent tube, communicating with an inverted jar full of water. The quantity of water displaced is a measure of the capacity of the lungs. A person in good health, with sound lungs, can displace six or eight pints. If the quantity displaced is much less than this, we may infer that the lungs are diseased, or compressed from without. "Muscular debility or spasm," says Mr. Abernethy, "may occasionally make the result doubtful, yet, in general, I believe it will afford useful information."

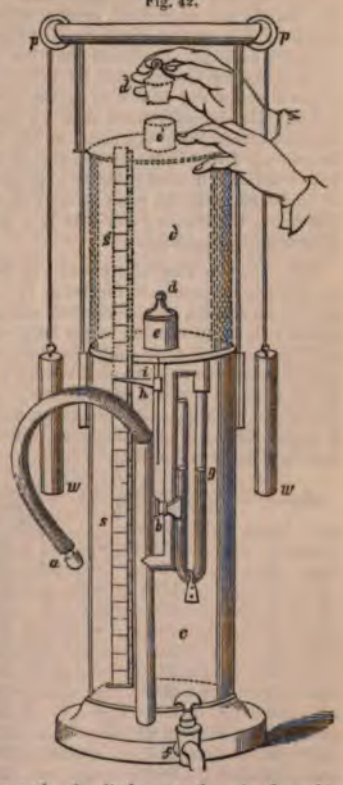
700. This method of estimating the capacity of the chest was also employed to a limited extent by Mr. Thackrah, of Leeds, who suggested that it might be usefully applied in examining recruits. An examination of nineteen officers and soldiers of the 14th Light Dragoons gave a capacity of chest varying from 220 to 295 cubic inches; the majority expiring from 240 to 250 cubic inches.

In tailors Mr. Thackrah found a mean of 221, and in shoemakers of 182 cubic inches.

701. Dr. Hutchinson has improved upon this rude method by substituting for the jar containing water a gasometer properly poised, and admitting of accurate adjustment; and as Dr. Hutchinson's instrument is now in use in several Assurance Offices, and is believed to afford useful indications in some cases of early chest affection, a woodcut, with a short description, is introduced in this place.

702. The instrument consists of a cylindrical vessel, *c*, capable of holding several pints of water, filled by a spout at the top, and emptied by a stop-cock, *f*, at the bottom. Into this vessel a cylinder, *c'*, of smaller size, counterpoised with the weights, *w w*, is inverted. The cover of this vessel has an opening, *e'* and *e*, in the centre, which may be closed at will by the plug, *d'* and *d*. An elastic tube, *a*, with a glass mouth-piece, and furnished with a stop-cock, *b*, communicates with the lower vessel, *c*. The bent glass tube, *g*, also communicates with the lower vessel, as does the glazed space, *i*. A graduated scale, *s'* and *s*, attached to, and moving with, the upper vessel, *c'* and an index, *h*, completes the instrument. If we suppose the gasometer, *c'*, to be filled with air, so as to occupy the position indicated by the dotted lines, the instrument is prepared for use by taking out the plug, *d*, and lowering the gasometer till the coloured spirit in the two legs of the syphon, *g*, stands at the same level. The index, *h*, is then placed at the level of the water in the glazed space, *i*, which, communicating with the reservoir, *e*, shows the height of the water within, and at zero of the scale. The plug, *d*, is now replaced, the stop-cock, *b*, being supposed to remain closed. The subject of the experiment then fills his chest completely, and applying his mouth to the mouth-piece, and at the same time opening the stop-cock, *b*, discharges the air from his lungs. The gasometer rises, the stop-cock, *b*, is again turned so as to close the passage for the air, the coloured liquid in the syphon, *g*, is again brought to a level in the two legs, and the height

Fig. 42.



of the scale above the index marks the number of cubic inches which have been expired, and measures, if the experiment has been properly performed, the capacity of the lungs, or, to speak more correctly, 'the quantity of air which an individual can force out of his chest by the greatest voluntary expiration, after the greatest voluntary inspiration.'

703. By very numerous observations made with this instrument, Dr. Hutchinson established certain averages for the healthy chest, which he then used as standards of comparison for the chests of consumptive patients. He found that the limits of the capacity of the chest in healthy persons were 80 cubic inches in a dwarf measuring 3 feet 9 inches, and 464 cubic inches in a giant measuring 6 feet 11½ inches. He also ascertained that the capacity of the chest was 40 or 50 cubic inches below the mean in very fat persons; that it was reduced from 4 to 6 inches by a moderate meal, and from 9 to 14 cubic inches after a full meal; that it is greatest in the erect posture; that it diminishes after 55 years of age; that it bears a very remarkable relation to the stature; and that it is greatly diminished in cases of pulmonary consumption.

704. The following table presents in the first column the ascertained or calculated capacity of the lungs in healthy persons between the ages of 15 and 55, and of different statures, from 5 to 6 feet; in the second column the capacity of the lungs of persons of the same stature, suffering from the early stage of pulmonary consumption; and, in the third column, the capacity of the lungs in persons of the same stature in the advanced stage of consumption. (The table is taken from Dr. Hutchinson's work on the Spirometer, the figures 5 feet 1 inch, 5 feet 2 inches, &c., being substituted for 5 feet to 5 feet 1 inch, 5 feet 1 inch to 5 feet 2 inches, &c.)

Stature.		*Capacity. Healthy Males.*	*Early Stage of Consumption.*	*Advanced Stage of Consumption.*
Feet.	Inches.	Cubic Inches.	Cubic Inches.	Cubic Inches.
5	1	174	117	82
5	2	182	122	86
5	3	190	127	89
5	4	198	133	93
5	5	206	138	97
5	6	214	143	100
5	7	222	149	104
5	8	230	154	108
5	9	238	159	112
5	10	246	165	116
5	11	254	170	119
6	0	262	176	123

705. The disparity which this table proves to exist between the capacity of the lungs in healthy persons, and in persons of the same stature labouring under incipient and advanced consumption, is so con-

siderable as in itself to prove the utility of this mode of testing the soundness of the lungs. But it must be borne in mind that emphysema and bronchitis, as well as diseases of the heart, encroaching on the lungs, would give rise to the same results. In making a practical application of the figures contained in the first column, it would probably be unsafe to set down to the account of disease of the lungs a moderate diminution of capacity; though Dr. Hutchinson himself is of opinion that if a man between 5 feet 7 inches and 5 feet 8 inches, who ought to expel about 220 cubic inches of air, can expel no more than 185 cubic inches, or if a 6-foot man, who ought to expel about 260 cubic inches, is not able to expel more than 200 or 220 cubic inches, disease may be suspected to exist. When we bear in mind the modifications in the capacity of the lungs due to the causes specified in § 703, and especially that, according to Dr. Hutchinson's statement, 'very fat men, of any stature, may blow 40 or 50 cubic inches less than the mean, and yet not be diseased in the chest,' it is but reasonable to suppose that other causes compatible with health may lessen the capacity of the chest. It will be seen, however, that the figures in the second column are so much below those belonging to the healthy chest, as to furnish in themselves a very strong presumption of the existence of disease.

706. It is scarcely necessary to observe, that in making use of Dr. Hutchinson's instrument, the patient should be in the erect posture, and that he should be narrowly watched to see that he performs the operation of expanding his chest and expelling the air carefully and properly. Allowance must also be made for advance in age above 55.

Dr. Hutchinson has also made a great number of observations, by means of an instrument of his own invention, upon the inspiratory and expiratory power, or the force exercised by the muscles of inspiration and expiration in inspiring or expiring air through the nostrils. As these experiments have obviously no very important practical bearing, this short notice of them will suffice.

707. The instrument invented by Mr. Coxeter has the advantage of being more portable and cheaper than Dr. Hutchinson's apparatus, and in the hands of a practised person, using it always in the same way, would afford useful indications. It consists of two flexible, inelastic, and air-tight bags—one large, the other small—connected by a tube fitted with a stop-cock. The larger bag has a second stop-cock fitted with a glass mouth-piece; and the smaller bag, which is graduated to 50 cubic inches, has also a second stop-cock. In using this instrument we close the stop-cock between the two bags, and open that fitted with the mouth-piece. Through this mouth-piece the patient, having taken a deep inspiration, discharges the contents of the chest into the larger bag. The stop-cock to which the mouth-piece is attached is then closed. The smaller bag being empty, and its terminal stop-cock closed, the central stop-cock is opened, and the bag filled with air. The central stop-cock is again closed and the terminal stop-cock opened, so as to allow the contents of the small bag to be expelled. This done

the same process is repeated till all the air contained in the larger bag has been transferred to the smaller one and measured off. As the results obtained with this instrument differ little from those obtained with Dr. Hutchinson's spirometer, the figures of the last table may be employed indifferently with either instrument.

708. *The Condition of the Texture of the Lungs.*—The means which we employ for ascertaining the condition of the texture of the lungs are familiarly known as percussion and auscultation.

709. *Examination of the Lungs by Percussion and Auscultation.*—The ear is employed in two ways in examining the lungs,—in listening to the sound occasioned by striking the walls of the cavity, and in listening to the sounds produced in the chest itself by the passage of air through the lungs, and by the movements which take place between the lungs and the cavity of the chest. Both these modes of examination are comprised in the meaning of the term auscultation; but it is usual to call the first *percussion*, and the second *auscultation*.

710. *Percussion.*—If the chest, instead of containing a variety of solid parts, were filled with air, it would yield, when struck, a sound like that of an empty barrel or drum; if, on the contrary, it were filled with solid animal substance, it would sound as dull as the arm or thigh. But containing, as it does, a spongy organ, the lung, including in its tissue a large quantity of air, it yields, when struck, a hollow sound, but one less hollow than that which it would give if containing only air. The more air it contains, the more hollow it sounds; hence the sound is clearer during inspiration than during expiration. If, again, the texture of the lung be so altered as to admit a larger quantity of air, the chest yields a clearer sound: this takes place in emphysema. On the other hand, if the lung from any cause admit less air than usual, the sound becomes more dull: this happens in congestion, in inflammation, in tubercular deposit; in the case of solid tumours forming in the lung itself, or occupying its place; as also when the lung is compressed by fluids collecting in the sac of the pleura, as in hydrothorax and empyema. But if, instead of fluid, air exist in the cavity of the pleura (pneumothorax), the sound, instead of being more dull, is more hollow than if the healthy lung were in contact with the walls of the chest.

711. The chest, then, yields a hollow sound when it contains air, a dull sound when air is excluded; the degree of hollowness or dulness depending upon the quantity of air. But there is another cause which influences the nature of the sound, viz., the thickness of the parietes of the chest itself. If two chests contain exactly the same quantity of air that will give the clearest sound which has the thinnest parietes. If the walls of the chest are padded with muscle or fat, the sound becomes more dull. In the healthy chest, then, the clearness of the sound will vary directly as the quantity of lung beneath the part struck, and inversely as the thickness of the parietes in that part.

712. Again, wherever the substance of the lung is thin, the sound on percussion is modified by the viscus lying immediately behind it: thus, below the fourth rib, the layer of lung lying in front of the liver on the right side is thin; the sound is consequently less clear than in the upper part of the chest. The thin layers of lung which overlay the heart, so as to leave only a small portion of it uncovered (2, Fig. 39), have the same effect. In all such cases where a thin layer of healthy lung lies in front of a solid organ, gentle percussion elicits the clear sound of the healthy lung, strong percussion that of the solid substance behind it. The limits of this clear sound heard on gentle percussion are somewhat extended during a deep inspiration, which stretches and expands the lungs, and diminished by forcible expiration, which contracts them. Tumours existing in the deeper seated portions of the lung, or consolidation of the lung itself, have the same effect as a solid viscus. Gentle percussion elicits the clear sound of the healthy lung, and strong percussion the dull sound of the tumour or condensed lung beneath it.

713. The parts of the chest which yield the clearest sound are those which are least covered with muscle, viz., the space immediately beneath the clavicle, the axilla, and the posterior parts of the chest, beneath the scapulæ.

714. The mass of the liver in the right hypochondrium explains the dull sound caused by percussion below the level of the sixth rib; the stomach, which usually contains flatus, accounts for the clearer sound generally heard on the left side; but when filled with solid or liquid food, the sound is deadened.

715. In examining the chest, the patient should be placed in the erect or sitting posture, and, if possible, in an open room. Curtains and bed-clothes dull the sound. The chest should be bare when practicable, but in females it may be covered by a single layer of clothing. Each part of the chest submitted to examination should be rendered as tense as possible; the anterior part of the chest, by stretching the neck and throwing back the shoulders; the supra-clavicular space by turning the neck to the opposite side; the axillæ, by raising the arms above the head; and the posterior part of the chest by causing the patient to fold his arms and stoop down. Opposite and corresponding points of the chest should be accurately compared. For this purpose, the position of both sides must be the same. If we are examining the anterior part of the chest, the hands must fall loosely at the sides; if the lateral regions, they must be raised equally above the head; if the posterior, they must be equally folded.

716. There are different ways of eliciting the sounds of the chest by percussion. We may strike with the points of the fingers, or with the flat of the hand; or we may interpose the fingers of the opposite hand, or a thick piece of India-rubber, or a plate of wood or ivory. Such things are called "plessimeters," and percussion, by means of them, is named "mediate percussion." Attempts have also been made

to combine a good plessimeter with a hammer, so arranged as to strike the plate each time with the same force. The most successful attempt of the kind is Dr. Sibson's "spring plessimeter," which consists of a round pad of India-rubber fixed to the end of an axis, and striking upon a plessimeter of ivory. The axis works through a collar, and being raised, is made to fall each time with equal force upon the plessimeter, by means of two elastic springs.

717. Direct percussion with the points of the fingers ought never to be employed, except for the purpose of throwing the muscles of the chest into action, with a view of ascertaining either the irritability of the muscles or the seat of pain. In many cases, especially in advanced phthisis pulmonalis, the skin and muscles are acutely sensitive, and the slightest touch occasions pain. This is a sufficient objection to direct percussion with the finger. Percussion with the open hand is little used, except as a means of contrasting the two sides of the chest over their whole extent at once.

718. Mediate percussion ought always to be preferred, and the best plessimeter is formed by one or two fingers of the left hand applied closely to the surface. The finger should always be applied with a tolerably firm pressure, especially in stout, flabby, dropsical, or emphysematous subjects. By such pressure the skin and flesh are condensed, and made better conductors of sound. The finger thus applied should be sharply struck by the three middle fingers of the right hand, taking care to strike perpendicularly to the surface, and not obliquely. In comparing the two sides of the chest, care should be taken to strike the same point, with the same force, and in the same condition of the chest, whether filled with air in inspiration, or partly emptied by expiration. The comparison can be most accurately made when the breath is held. When it is desired to ascertain the condition of a small spot, one finger only of the right hand should be used.

719. The chief indications given by percussion in disease have been already hinted at. The indications afforded by clear and dull sounds respectively are shown in the following table:—

	In the Lungs.	*External to the Lungs.*
Clear Sound on Percussion.	Healthy condition.	
	Emphysema.	Pneumothorax.
	Tubercular excavation.	
Dull Sound on Percussion.	Congestion and hepatization.	Pleuritic effusion.
		Hydrothorax.
	Pulmonary apoplexy.	Hæmathorax.
	Œdema.	Tumours in pleura or mediastinum.
	Tubercular deposit.	
	Other morbid degenerations.	Diseases of heart or arteries, with enlargement.

720. From the position in which the clear or dull sound occurs, we may often infer the cause by which it is produced. Thus emphysema, though it may be confined to one side, and to a small portion of lung, commonly occurs on both sides of the chest at once, and over a large

portion of the lungs; pneumothorax, on the contrary, is usually confined to one side, and tubercular excavations occupy, for the most part, the upper lobes of the lungs.

721. A dull sound may arise from a greater variety of causes, which, however, admit of the same distinction. Thus congestion and the various degrees of hepatization, the consequence of pneumonia, occupy chiefly the lower lobes, on one or both sides; œdema commonly exists in both lungs at the same time; tubercular deposit is found chiefly in the upper lobes, whilst other morbid degenerations occupy all parts of the lungs indifferently. Of causes external to the lungs, effusion of blood or pus into the cavity of the pleura is commonly confined to one side; hydrothorax extends to both; tumours in the pleura and mediastina may occupy any position: diseases of the heart itself affect the parts in the neighbourhood of that organ; and aneurismal tumours chiefly the upper and anterior part of the chest.

722. *Auscultation.*—The passage of air through the various structures of the lungs, in inspiration and expiration, is accompanied by certain sounds, which are easily recognised on applying the ear or the stethoscope to the chest. They vary in different parts of the chest. In the neck, or over the upper part of the sternum during inspiration, a hollow, blowing sound is heard—this is tracheal respiration; on each side of the upper part of the sternum, between the scapulæ, and sometimes in the axillæ, a whiffing tubular sound is heard—this is bronchial respiration; on most other parts of the chest a sound is heard which has been compared to that of a sleeper breathing gently through the nostrils, or to the sighing of a gentle breeze—this is called vesicular, from its presumed seat, the air-cells. When, as is the case in children, this breezy murmur is very distinct, it is termed *puerile respiration.* The student should familiarize himself with these sounds, by applying the ear to the healthy chest; and as these sounds are most distinct in children, he should examine it in them. This sound is heard both in inspiration and expiration; but the expiratory murmur is less distinct, and of shorter continuance.

723. The intensity of this respiratory murmur varies in different healthy persons, and in the same person at different times. It is more intense, as has just been stated, in young children; and also in females —a fact which may perhaps be accounted for by the increased respiratory effort necessitated by the confinement of the chest by stays. It is also augmented by deep inspiration; hence, when the sound is naturally dull, it may be increased by causing the patient to breathe quick, or to draw a deep breath, or to cough, whereby the lungs are emptied, and a full inspiration secured. The respiratory murmur is also rendered more intense, or becomes *puerile,* in one part of the chest by consolidation of the rest of the lung. Impediments to the free action of other parts of the lung will have the same effect.

724. The respiratory murmur is sometimes scarcely perceptible; but when this feeble respiration does not coexist with any other morbid sounds, or with dulness on percussion, it should not be regarded as an indication of disease.

725. The respiratory murmur may also be absent in limited portions of the chest, from the bronchial tubes being obstructed by tenacious mucus; but here percussion will give a clear sound; or it may be absent, because the air-cells are filled with fluid from within, or compressed from without. In this case, the chest will sound dull on percussion, except where the pressure is occasioned by air in the pleura (pneumothorax).

726. The *bronchial* respiration in the healthy state is only heard in parts of the chest corresponding with the track of the large bronchial tubes; but if the lung be condensed, from whatever cause, it not only loses its proper respiratory murmur, but, becoming a better conductor of sound, conveys to the ear the sound produced in the bronchial tubes. Hence, bronchial respiration heard with unusual distinctness near the site of the bronchial tubes, or heard on one side when not audible on the other, or with widely-differing intensity in the two sides, or in parts where it is not heard in health, is an indication of consolidation of the lung by inward disease or outward pressure.

727. The bronchial respiration, as thus heard, assumes different characters; sometimes resembling puerile respiration in an intense degree; at other times, the noise made by drawing the breath through the closed hand; at others, that occasioned by blowing into a quill; at others, the short puff used in blowing out a candle.

728. To the same class of sounds belongs the so-called *cavernous* respiration, which, in its more marked form, produces a perfect illusion of air drawn through the stethoscope during inspiration, and puffed into the ear during expiration. This arises either from dilated bronchi, or, more generally, from a cavity in the substance of the lung.

729. The *amphoric* respiration closely resembles the sound produced by blowing into a bottle, and is caused by the passage of air into a cavity lined with a dense membrane.

730. Besides the respiratory sounds produced in the tubes and air-cells of the lungs, and occurring when those parts are moistened by their natural secretions, and in their natural quantity, there are other sounds due to the increased resistance offered to the passage of air through those parts, by constriction of the parts themselves, or by fluids of various degrees of consistence. These sounds are called *rattles* in English, *râles* in French, and *rhonchi* in Latin. The term *rhonchus* is in most common use in this country. These sounds are further distinguished as *dry* and *moist*—the dry being due to the swelling of the mucous membrane, constriction of the tubes, obstruction from viscid phlegm, &c.; the moist to fluids of less consistence accumulated in the several parts of the lungs.

731. Rhonchi occur in three situations,—in the air-cells (*vesicular*), in the bronchial tubes (*bronchial*), and in cavities formed in the structure of the lung (*cavernous*).

732. *Vesicular rhonchi* are of two kinds, (*a*)—*dry crepitous* or *dry vesicular rhonchus*. (Râle crepitant sec à grosses bulles, or craquement, of Laennec.) This sound resembles that produced by blowing into a dried bladder. It occurs only in emphysema of the lungs, and is most distinctly heard in interlobular emphysema. It is only heard during inspiration. (*b*) *Moist crepitant and sub-crepitant rhonchus*. (Râle crepitant of Laennec.) This resembles the crepitation of salt thrown on hot iron, or the sound produced by rubbing a lock of hair between the finger and thumb, or the crepitation of a healthy lung distended with air, when pressed by the hand. It exists in all cases where the smallest bronchi and air-cells are partially filled with viscid fluid, provided that they still admit the passage of air. Thus it is present in œdema and apoplexy of the lungs, occasionally in pulmonary catarrh and bronchitis, and in the first stage of phthisis. It is also present in the first stage of pneumonia, constituting its most constant and characteristic sign; it disappears when hepatization comes on, and reappears when the inflammation is subsiding, and the lung begins to resume its healthy condition. In the first and last of these stages the moist crepitant rhonchus alters and obscures the respiratory sound, but does not completely mask it; in the stage of hepatization, both sounds are absent.

733. *Bronchial rhonchi*.—These, too, are *dry* or *moist*. The *dry* bronchial rhonchi are the *sibilant* and *sonorous*. The *sibilant* resembles a prolonged whistle, or the momentary and interrupted chirping of birds, or the sound emitted by the sudden separation of two portions of smooth oiled stone. The *sonorous* rhonchus resembles the snoring of a person asleep, or the bass note of a violoncello or bassoon, or the cooing of a pigeon. All these varieties of sound arise from contraction of a portion of a bronchial tube by thickening of the mucous membrane, or by pressure of a limited portion of consolidated lung, or by a plug of tenacious mucus, the sibilant rhonchus existing probably in the smaller, and the sonorous in the larger bronchial tubes. A sort of *click* is also sometimes heard, either during inspiration or expiration, arising probably from the sudden displacement of a portion of viscid mucus adhering to the interior of a bronchial tube. The *moist* bronchial rhonchus is called the *mucous rhonchus* (râle muqueux of Laennec). It is due to the passage of air through tubes containing a fluid, and closely resembles the sound produced by blowing through a pipe into soap and water. It is present in pulmonary catarrh, bronchitis, and hæmoptysis; and in all diseases accompanied with much expectoration, as in the third stage of pneumonia, and in phthisis. *Tracheal* rhonchus is a mere modification of this sound, existing in the trachea when filled with fluid. It has been compared by Laennec to the rolling of a drum at a distance, or the noise of a carriage in a paved street.

734. *Cavernous rhonchi*.—These, also, are *dry* and *moist*. The *dry*

cavernous rhonchus is extremely rare, as the cavities to which it owes its existence are rarely found empty. The *moist* cavernous rhonchus has its seat in a cavity of the lungs, which, in ninety-nine cases out of a hundred, is of tuberculous origin. It consists of the bubbling or gurgling of a fluid in a *circumscribed* cavity, and forms, when well marked, the surest sign of a tuberculous excavation.

735. In addition to the sounds just described, there are others which are produced by the *voice*. If we put the ear or the stethoscope to a healthy chest, we commonly perceive a diffused resonance: this is most distinctly heard in the situation of the bronchial tubes, as, for instance, between the scapulæ. If we lay the hand on the chest while a person is speaking, especially if the voice be a bass, we perceive a vibration. This has been called *fremitus*. If, instead of applying the stethoscope to the chest, we place it over the larynx or trachea, the voice does not merely vibrate, but seems to pass through the tube to the ear, being much more clearly perceived by the ear applied to the stethoscope than by the other. This sound is called *laryngophony*. The same sound is heard when the lungs between the bronchial tubes and the parietes of the chest are condensed, and especially if the bronchi are at the same time enlarged—this is *bronchophony*. If in the cavity of the pleura, external to a condensed lung, a thin layer of fluid is deposited, as happens in recent cases of pleurisy, a sound is heard like the bleating of a goat, or the squeaking of Punch —this is *œgophony*. Again, in cases of pulmonary excavation, the sound of the voice passes through the tube to the ear, as in laryngophony, and receives the name of *pectoriloquy*. Lastly, when a large cavity, communicating with the bronchi, containing fluid and filled with air, exists in the chest, a sound is produced during respiration, by speaking, or in coughing, which resembles either the falling of a pin into a cup or glass, or that caused by blowing quickly and forcibly into a bottle with a narrow neck. The first is called *metallic tinkling*, the second *amphoric resonance* or *buzzing*. These sounds are heard most distinctly in pneumothorax; but they also occur in large abscesses of the lungs. In very rare cases of pneumothorax this metallic tinkling has been produced by each beat of the heart.

736. There is one sound, which, though due to an external cause, may be confounded by the beginner with sounds produced within the chest—the *muscular sound* (bruit musculaire). It is always heard during muscular contraction, and is peculiarly distinct during the tremulous action of the muscles from cold, and when the muscles are put upon the stretch. When the neck and shoulders are forcibly thrown back in examining the anterior part of the chest, when the hand is forcibly raised above the head, or the arms strongly folded across the chest, the patient stooping at the same time, this sound is very distinctly heard. It is an extremely rapid vibrating sound, bearing a close resemblance, when strongly marked, to the distant rumbling of carriages over a paved street. The pupil should make himself familiar with this sound, by placing his ear on the pillow, and

contracting the masseter muscles with different degrees of force and quickness, taking care, at the same time, to avoid grating the teeth. When he closes the jaw gently, he will hear the rapid vibration just mentioned; a stronger contraction will render the vibration still more rapid; a strong and abrupt contraction closely imitates the first sound of the heart; a still stronger and quicker one produces a sound which might be confounded with the "bruit de soufflet," and the strongest and most abrupt contraction causes a species of cooing sound. The ear applied to the biceps muscle during a strong contraction, or to the abdominal muscles during a violent and abrupt expiratory effort, perceives a sound not easily distinguished from the first sound of the heart. The continuous nature of the "bruit musculaire" distinguishes it at once from all the respiratory sounds.

737. It only remains to mention two sounds produced external to the lungs, and in the sac of the pleura. The one is a *friction* or *to-and-fro* sound, occurring both in inspiration and expiration when the pleuræ are dry and rough with deposits; the other a *splashing* sound, distinctly heard by the ear applied to the chest of a patient suffering from a collection of fluid mingled with air in the cavity of the pleura, when a sudden jerk (*succussion*) is given to the chest of the patient. This splashing sound is sometimes heard in very large tuberculous cavities.

738. The following table, which presents at one view some of the chief points just stated, may be referred to with advantage, especially by the young auscultator. It is taken, with some modifications, from Dr. Williams's article on the Diagnosis of the Diseases of the Chest, in the Library of Practical Medicine, vol. iii. p. 18.

SOUNDS PRODUCED BY THE PASSAGE OF THE AIR IN RESPIRATION.

NATURAL.

Tracheal; heard in the neck and at the top of the sternum.
Bronchial; near the upper part of the sternum, and between the scapulæ.
Vesicular; on most other parts of the chest.

MORBID.

Bronchial Respiration; from condensed lung.
Cavernous, *Amphoric*; in morbid cavities, communicating with the bronchi.

RHONCHI. *Moist.* *Mucous*; liquid in bronchi.
Crepitant; viscid liquid in small tubes and air-cells.

Dry. *Sibilant*, *Sonorous*, *Dry mucous.* Produced by contraction of bronchi, by swelling of mucous membrane, by pressure, and by tenacious mucus.
Dry crepitant; in emphysema, especially interlobular emphysema.
Cavernous; liquid in morbid cavity.

SOUNDS OF THE VOICE TRANSMITTED THROUGH THE CHEST.

NATURAL.

Laryngophony ; over larynx.
Tracheophony ; over neck and upper part of sternum.
Bronchophony ; near top of sternum, between the scapulæ, &c.
(*Pectoral fremitus ;* perceptible to the touch in many parts of the chest.)

MORBID.

Bronchophony ; condensed lung.
Ægophony ; the same, vibrating through a thin layer of fluid.
Pectoriloquy ; in a cavity of the lungs.
Tinkling, &c. ; a changed echo of voice or cough in a large cavity containing air and liquid.

SOUNDS PRODUCED BY THE MOTIONS OF THE LUNGS.

Friction-sounds, when the pleuræ are dry or rough from deposit.

SOUND PRODUCED BY SUCCUSSION.

A splashing sound, when the cavity of the pleura contains fluid mixed with air; or when the same combination occurs in a tuberculous cavity of very great extent.

SOUNDS PRODUCED BY THE CONTRACTION OF THE MUSCLES.

Vibratory sound of varying intensity.

The Heart.

739. The position of the heart and large vessels, and their relation to the walls of the chest, and to the lungs, will be best understood by referring to the woodcuts at pp. 166 and 167. It will be seen that the lungs, which fill so large a part of the chest, leave an irregular space (1 and 2, Fig. 39) in the anterior part of its cavity unoccupied. That part of this space (1) which lies behind the upper half of the sternum, is of a nearly uniform width of two inches, the anterior edges of the two lungs being at this part of the chest nearly parallel. The lower portion of this space (2), on the other hand, being formed by the wide separation of the left lung from the right (which latter continues its nearly straight course along the right margin of the sternum), is of an irregular triangular shape. The upper portion of this space corresponds to the large vessels, the lower portion to the heart. This space, however, by no means represents the size and shape of the heart and large vessels, but merely of such portions of them as are not concealed from view by the thin lappets of the lungs stretched over them; nor can the heart and large vessels be fully seen until the pericardium and the cellular membrane connected with it have been dissected away, and these portions of the lungs have been turned aside to the right and to the left. Posteriorly (Fig. 40), the inner edges of the two lungs

are nearly parallel, leaving a centre space (1 and 2) about two inches wide, occupied by the trachea and œsophagus above, and by the œsophagus and descending aorta below. In consequence of the great thickness of the spine and muscles of the back, this space does not afford facilities for stethoscopic examination.

740. The pericardium, which invests the heart with a close and a reflected covering, attaches itself firmly by the latter to the large vessels above, and to the diaphragm below; so that the heart itself beats within this serous covering, subject to be pulled down with it, when it is put on the stretch by the diaphragm descending in the act of inspiration, and to be moved upwards when it is released by the diaphragm being thrust up by the viscera of the abdomen during expiration.

741. As the large vessels, which are firmly bound to each other, and to surrounding parts, arise from the base of the heart, and as the short ascending cava binds the base of the heart to the tendinous portion of the diaphragm, that portion of the organ is not subject, in healthy persons, to any material alteration of position.

742. The large vessels, therefore, form a sort of fixed point on which the heart moves. From this fixed point it is tilted and twisted forward during the contraction of the ventricles; towards this same point it is raised with the diaphragm, during expiration; and from this point it is pulled downwards into a more vertical position during inspiration. These changes of position are exaggerated by the ribs moving in opposite directions to the diaphragm.

743. The change in the position of the heart, due to these movements of inspiration and expiration, is so considerable, that, during a deep inspiration, the apex of the heart, instead of beating in the fifth intercostal space, may be felt in the sixth, but indistinctly, in consequence of the elevation of the ribs drawing the lung in front of it. By a forced expiration, on the other hand, the ribs are drawn down and brought more completely into contact with the heart, so that the beat of the heart may be felt in the fourth intercostal space, and even as high as the third rib.

744. The same act of inspiration which depresses the diaphragm, and tilts the ribs outwards, expands the lungs, so that their anterior edges slide over the pericardium; and the same act of expiration which forces the diaphragm upwards, and pulls the ribs downwards, so as to contract the chest, causes the lungs to collapse, and their anterior edges to slide back again and leave a larger portion of the pericardium exposed. A distended stomach, or an enlargement of the abdomen, from whatever cause arising, will have the same effect on the position of the heart as an act of expiration.

745. In consequence of the freedom of motion which the body of the heart enjoys, it also undergoes changes of position as the posture of the body is changed. It falls back and quits the anterior walls of the chest, to some extent, when we lie down, and it moves somewhat to the right or to the left, as we lie on the right or on the left side.

746. The heart, then, occupies an oblique position within the chest, with its base, fixed by the attachments of the large vessels, directed (the body being erect) upwards, backwards, and to the right side; the apex downwards, forwards, and to the left; the base separated from the fifth, sixth, and seventh dorsal vertebræ by the descending aorta and œsophagus; the apex, when the ventricles are contracted, and the respiration tranquil, corresponding to the space between the fifth and sixth ribs—a point about two inches below, and one inch to the inside of the left nipple, or two inches and a half from the left border of the base of the ensiform cartilage. One half of the heart, consisting of a small portion of the left auricle and the whole of the left ventricle, and the left vertical half of the right ventricle, lies to the left of the sternum, behind the cartilages of the fourth and fifth, and the sternal articulations of the fifth, sixth, and seventh ribs, and the fourth, fifth, and sixth intercostal spaces: the other half of the organ, consisting of nearly all the remainder of the right ventricle, lies behind the lower half of the sternum, a small portion only of the ventricle and the right auricle being behind the sternal articulations of the third, fourth, and fifth ribs, and the fourth and fifth intercostal spaces of the right side. The flat under and posterior surface of the left ventricle lies upon the diaphragm, which separates it from the left lobe of the liver; the rounded upper and anterior right ventricle is turned upwards and forwards, separated from the sternum and thin anterior edges of the lungs by the pericardium and loose cellular membrane connected with it.

747. The orifices and valves of the heart, which are the seat of the principal abnormal sounds heard on applying the ear or the stethoscope to the region of the heart, are very close to each other, the orifice of the aorta and its valves lying nearly directly behind the orifice of the pulmonary artery and its valves, while the right and left auriculo-ventricular orifices, with the tricuspid and mitral valves, are only a third of an inch apart, and lie just below the orifices and valves of those arteries.

748. The position of these valves in the healthy subject, relatively to the bones and external parietes of the chest, has been determined by transfixing them with needles passed through the walls of the chest. It has been ascertained in this manner that, in the recumbent position of the body, the bulging portion of the pulmonary artery corresponds to the interspace between the second and third ribs of the left side, close to the sternum. Consequently a line, *b b*, Fig. 43, drawn across the sternum to the inferior margin of the third ribs, passes over the valves of the pulmonary artery, a little to the left of the mesial line (at *v*), and about half an inch above the valves of the aorta, which lie (in the erect position of the body) behind the pulmonic valves. The auriculo-ventricular orifices will, in like manner, be found to correspond to a line drawn across the sternum at a somewhat lower level in the interspace of the third and fourth ribs, the valves themselves being situate somewhat to the right and left of the semilunar valves of the aorta and pulmonary artery respectively, and the right auriculo-ven-

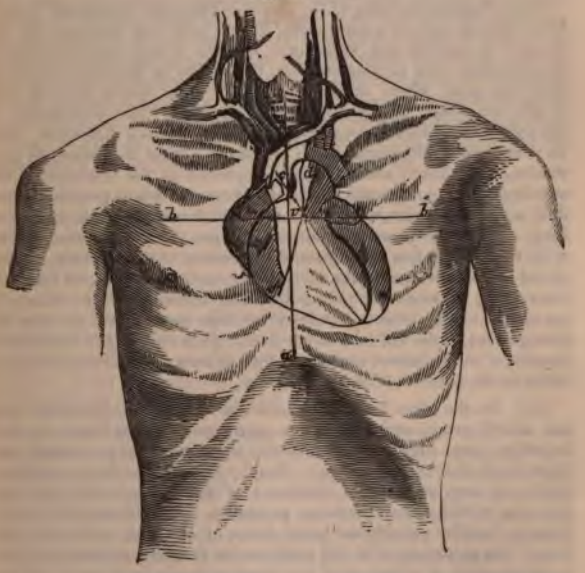
tricular valve being at a lower level by about a third of an inch than the left.

749. As a knowledge of the exact relation of the heart itself, and of its several constituent parts, to the bones and to the parietes of the chest, is of the first importance, with a view to a sound diagnosis of diseases of the heart, the principal points already stated will be briefly recapitulated, reference being made to the annexed engraving.

750. 1. *Parts of the Heart and Large Vessels not covered by the Lungs, and separated from the walls of the chest only by the Pericardium and loose Cellular Tissue.*—The root of the pulmonary artery; the ascending aorta; the anterior surface of the right ventricle; a small portion of the appendix of the right auricle, with the apex and anterior margin of the left ventricle. See 1 and 2, Fig. 39, and the unshaded portion of the heart in Fig. 40.

2. *Pulmonary Artery.*—Close to the sternum, in the interspace of the second and third ribs of the left side.

Fig. 43.



3. *Aorta.*—The ascending aorta lies behind the mesian line of the sternum. The arch of the aorta crosses the middle of the upper bone

of the sternum, the crown of the arch being on a level with the first intercostal space. The descending aorta passes to the left side of the third dorsal vertebra.

4. *Valves of the Aorta and Pulmonary Artery.*—Immediately to the left of the intersection with the mesial line, *a a*, of a line, *b b*, drawn across the sternum to the inferior margins of the third ribs. The orifice of the aorta lies immediately behind that of the pulmonary artery. These valves correspond to the body of the fifth dorsal vertebra.

5. *Auriculo-Ventricular Valves.*—To the right and left of the valves of the aorta and pulmonary artery respectively, about a third of an inch apart, the tricuspid being somewhat lower than the mitral.

6. *Apex of the Heart.*—The heart's beat, when the body is erect and the respiration tranquil, is felt between the fifth and sixth ribs of the left side, an inch and a half below, and an inch to the inside of the left nipple.

751. In examining the heart, three points demand attention—its *position and size*, its *motions*, and its *sounds*.

752. *Position and Size of the Heart.*—These are determined chiefly by percussion, and, in certain cases, though with less accuracy, by the touch. In healthy and well-formed persons a dull sound is elicited by percussion over an area of about two inches in diameter, extending from the point where the beat of the heart is felt to the left side of the lower half of the sternum. This space, which corresponds to the part of the heart uncovered by the lungs, yields a dull sound, both on strong and slight percussion. Beyond this space the sound, on percussion, is gradually softened off, in proportion as the thickness of the overlapping lung increases; but, on strong and sharp percussion, the dull sound of the heart is heard through the intervening portion of lung. When the heart is enlarged, or when the pericardium is filled with fluid, the region of dulness is increased; the same effect is produced by consolidation of the surrounding portions of lung, by tumours intervening between the pericardium and the walls of the chest, by partial pleuritic effusions confined by false membranes, or even by enlargement of the left lobe of the liver. It is only in the ascertained absence of such diseased conditions that dulness on percussion may be taken as the measure of the heart's size.

753. On the other hand, the absence of dulness on percussion does not afford certain evidence of non-enlargement of the heart, as surrounding parts may give an unusually clear sound on percussion, and thus mask the heart-affection. Emphysema of the lung, pneumothorax, or even an unusual distension of the stomach with gas, may give rise to such a clear sound on percussion. The dulness also ceases, even in healthy persons, on lying down, or on taking a deep inspiration. The persistence of a dull sound under these circumstances affords evidence either of adhesions of the heart or lungs, or of such a degree of enlargement of the heart, or distension of the pericardium, as prevents the heart from receding.

754. *Motions of the Heart.*—The auricles and ventricles contract alternately, the systole of the one being synchronous with the diastole of the other. The auricles first contract, then the ventricles. The contraction of the ventricles is followed by their diastole, and this by a short pause. During the diastole of the ventricles, and the short pause which succeeds, the blood flows from the auricles into the ventricles, and the contraction of the auricular appendices which immediately succeeds the pause excites the ventricles to new contraction.

755. The order, therefore, of the heart's movements is as follows:—systole of auricles, systole of ventricles, diastole of ventricles, pause. This order of succession is called the *rhythm* of the heart's motions. Of the *whole* time consumed, the systole of the auricles occupies less than a fourth, the systole of the ventricles a half, the diastole of the ventricles more than a fourth, and the pause a fourth.

756. The *impulse* of the heart is synchronous with the contraction of the ventricles and the pulse in the large arteries. It was formerly attributed to the tilting of the apex of the heart against the ribs, but it it is now understood to depend on the sudden change of shape accompanied by rigidity which the heart undergoes—this change consisting of a bulging of its anterior surface through its entire length. The effect of this sudden bulging of the rigid parietes of the ventricles is felt chiefly at the apex, because a thick mass of spongy lung which absorbs and neutralises the force of the impulse intervenes over the rest of the heart's surface. A full expiration, by diminishing the size of the intervening portion of lung, extends the limits of the impulse, and the same result follows when the body is bent forward.

757. The strength of the impulse, and the extent of surface over which it is felt, vary greatly in disease. When the walls of the heart are thickened at the expense of the cavities (concentric hypertrophy), the impulse is little increased in extent, but greatly augmented in force. When, on the other hand, the ventricles are diminished in thickness, the impulse is less forcible. If thickening of the walls is accompanied by increase of the size of the cavities, in which case the heart will be greatly enlarged, the impulse is both stronger and more extensive, and may become perceptible over a space of five or six square inches. When the walls are thin and the cavities enlarged, the impulse will be of less force, but of greater extent.

758. Fluid in the pericardium renders the impulse indistinct, and the place in which it is felt variable. Adhesions between the heart and pericardium, on the contrary, confine the impulse to the same spot, so that change of posture, and the different states of the parietes of the chest in inspiration and expiration, have little or no effect upon it. Tumours formed within the chest and various diseases of the lungs may displace the heart, and cause the spot in which its impulse is felt to vary. Congenital transposition of the heart will have the same effect. The impulse will be more distinctly felt, *cæteris paribus*, when the contraction of the ventricles is abrupt.

759. When the heart acts strongly, and especially in emaciated subjects, its movements may be seen as well as felt, and their force, extent, and nature furnish useful indications. When the heart is enlarged, these movements may be distinctly perceived in the epigastric region.

760. The heart is also subject to various irregularities in its action; such as double and triple impulse, depending generally on spasmodic and partial contraction of the ventricles, and on irregular transmission of blood from the auricles; to intermittence, inequality, increased or diminished force, &c. As most of these irregular actions of the heart produce appreciable changes in the pulse, they will be best considered under that head.

761. *Sounds of the Heart.*—The natural sounds of the heart are two in number—a dull, prolonged sound, synchronous with the heart's impulse, and consequently with the contraction of the ventricles and the pulse in the larger arteries, and an abrupt, clear sound. The second sound immediately succeeds the first, and is followed by an interval of silence. The first sound is loudest over the middle of the ventricles, the last over the site of the semilunar valves, and for a short distance upwards along the sternum. They are best distinguished when the pulse is slow, and they are more clear in emaciated than in stout persons. We may hear them in our own persons when lying down, especially on the left side; and in rare instances of disease they can be heard even at a short distance from the patient. The intensity of the sound diminishes as the distance from the præcordia increases.

762. In stout persons, the sounds are limited to the region of the heart itself; in narrow-chested persons, and in children, they may be heard all over the chest, before as well as behind. Any cause which increases the conducting power of the contents of the chest extends the limits within which the sounds are heard. Thus when the lungs are consolidated, as in pneumonia, phthisis, &c., the sounds of the heart are heard much beyond their usual limit. Should consolidation be confined to the right side, the sounds of the heart would be heard more distinctly on that side, both before and behind, than on the left, and this fact may become a means of diagnosis.

763. *Cause of the Sounds.*—Much difference of opinion has existed on this subject, but the majority of medical men now agree in attributing the first sound to the contraction of the ventricles, and the second sound to the reaction of the column of blood in the aorta and pulmonary artery on the semilunar valves, by which those valves are suddenly closed with a kind of click. Some high authorities have attributed both sounds to the closing of the valves, the first sound to the closing of the tricuspid and mitral valves, the second to the closing of the semilunar valves.

764. In support of the opinion which attributes the first sound to the contraction of the ventricles, it may be stated that the "bruit

musculaire" is certainly a sufficient explanation; for no one who has placed his head upon the pillow, and contracted his masseter muscles with varying degrees of force and rapidity, can have failed to recognise the first sound of the heart in every degree of distinctness which it exhibits in healthy persons, from the dull, prolonged sound which it has when the circulation is tranquil, up to the cooing sound which accompanies its more powerful and rapid contractions. It is a strong confirmation of this view that an excessive contraction of the abdominal muscles produces a sound not to be distinguished from it.

765. The sounds of the heart may be changed in intensity or in kind. An increase or diminution of *intensity* is a very common occurrence. An increased loudness of sound is often heard during nervous palpitations, both by the patient himself and by his attendants; it may also be produced by dilatation of the ventricles, accompanied with thinness of their parietes. In the former case, the impulse is at the same time increased; in the latter, diminished. On the other hand, the sounds may become so feeble as to be heard with difficulty; as is the case in general debility, or in debility of the heart itself, in obstructed pulmonary circulation, in cases where the heart is overloaded with blood, in softening of its fibres, and in excessive hypertrophy. In the latter case, there will be a strong impulse with weak sounds.

766. In cases of nervous palpitation, and after violent exercise, both sounds of the heart are unusually distinct, the action of the muscular fibres being strong and abrupt, and the elastic reaction of the aorta closing the valves with a sudden jerk: hence the loudness of the first sound and the peculiar abruptness of the second.

767. But besides these differences in degree, there are other sounds present in certain unusual or diseased conditions of the circulation. Some of these belong to the heart, and others to the blood-vessels. They are the following:—The *bellows sound* (bruit de soufflet), the *simple blowing sound*, the *hissing sound*, the *sawing sound* (bruit de scie), the *rasping sound* (bruit de râpe), a *humming sound* (bruit de diable) a *buzzing sound* (bruit de mouche), a *whizzing sound*, and peculiar musical sounds, such as cooing, whistling, &c.

768. The sounds heard over the region of the heart itself, or in the large vessels which spring from it, are chiefly the bellows sound and its modifications—viz., the sawing or rasping sound, and the several musical sounds.

769. The *bellows* sound is always produced when there is a marked disproportion between the force of the heart's contractions and the size of the tubes or orifices through which the blood has to pass. It may arise—1. in persons in perfect health, during very violent contraction of the heart, the arteries retaining their normal size, as in nervous persons during violent palpitations, the heart contracting both quickly and forcibly; in chlorotic females, arising, as it is thought, from a thin condition of the blood; and in cases of great debility from sudden hæmorrhage. In all these cases the sound is not constant. When

present, it bears a close resemblance to the panting noise of a locomotive, as it starts on its journey. 2. From narrowing of the orifices, the heart contracting with its usual force, or with increased violence: as where the orifice of the aorta or pulmonary artery is contracted, with or without enlargement and hypertrophy of the corresponding ventricle. 3. From narrowing of the orifices by vegetations and incrustations on the valves, the consequence of inflammation, or by polypous concretions formed during life. 4. From inefficiency of the valves, as in adhesion of the aortic or auriculo-ventricular valves to the adjacent parietes.

770. The young stethoscopist must be guarded against confounding a rapid tubular respiration with a *bruit de soufflet*. If there should be any doubt as to the true cause of the sound, the patient must be made to hold his breath.

771. Most of these cases resolve themselves into a disproportion between the force of the heart's beat and the size of the orifices, or into some obstacle to the flow of blood. The position in which they are heard, and the sound of the heart which they accompany, will often enable us to fix upon the precise seat and cause. Thus, sounds heard only in the region of the heart or over the position of its valves, and becoming indistinct when the ear is made to follow the course of the large arterial trunk, but increasing in distinctness as the ear approaches the apex of the heart, may be ascribed to disease of the auriculo-ventricular valves; or to causes external to the heart itself, and having the pericardium for their seat. On the other hand, sounds heard over the position of the valves, and remaining equally distinct or increasing in distinctness, as the ear follows the course of the large vessels, may be referred to diseases of the coats, or of the semilunar valves of the aorta or pulmonary artery. Of the two auriculo-ventricular valves, the mitral valve is the most likely seat of disease. Of the two large arteries and their valves, the coats and valves of the aorta are much the most liable to alterations of structure.

772. If the abnormal sounds accompany the first beat of the heart, they are most probably due to disease of the auriculo-ventricular orifices, of the valves of the arteries, or of the coats of the arteries themselves. When they accompany the second sound, they are most likely to arise from disease of the aortal valves. If they are heard with both sounds, they may be due to disease of the auriculo-ventricular valves combined with disease of the valves of the aorta or pulmonary artery; or to disease of the coats of the aorta with that of its valves. The position in which the sounds are heard must be taken into account in all these cases.

773. A more minute diagnosis of the causes of abnormal valvular sounds may be arrived at by considering the position of the valves in connexion with the direction in which the sounds due to them are most readily conducted. In the case of the tricuspid valve, it is natural to expect that the valvular sound would be conducted by the walls of the right ventricle, so as to be most distinctly perceived about

the attachment of the right columnæ carneæ. In like manner, it is to be expected that abnormal sounds due to disease of the mitral valve will be most distinctly heard at the point of attachment of the left columnæ carneæ, or, in other words, at the apex of the heart. So also with the abnormal sounds due to disease of the coats or valves of the two great arteries. As the coats of those arteries will be the best conductors of sounds produced at the roots of those arteries themselves, or in any part of their course, the sounds will continue distinctly audible along the track of the respective vessels, but become less and less distinct as the ear is made to travel in a direction from the base to the apex of the heart. Aortal murmurs, therefore, will continue distinct behind the middle of the sternum, and in the direction of the right sub-clavicular space, while abnormal sounds due to disease of the coats or valves of the pulmonary artery, while becoming indistinct in that direction, will be most distinct at the left of the sternum, between the second and third ribs, and will continue distinct in the track of the left pulmonary artery, or for a short distance in the direction of the left sub-clavicular space.

774. The following diagnosis of valvular sounds is in accordance with this statement.

1. A murmur with the *first* sound of the heart heard over the site of the semilunar valves, and distinct at *c* (Fig. 43, p. 185), is *aortic*.

2. A murmur with the *first* sound heard in the same situation, but distinct at *d*, is *pulmonic*.

3. A prolonged murmur with the *second* sound, loudest over the site of the semilunar valves, is due to regurgitation through the semilunar valves,—of the aorta, if the sound is loudest in the direction *c e*; of the pulmonary artery, if it is loudest in the direction *d f*; but in either case becoming less intense, as the ear is made to travel from the base towards the apex of the heart.

4. A murmur with the *first* sound, loudest at *f*, is from tricuspid regurgitation.

5. A murmur with the *first* sound, loudest at *e*, is from mitral regurgitation.

6. A murmur with the *second* sound, loudest at *e*, is from contraction of the mitral valve; if loudest at *f*, it is from contraction of the tricuspid.

Lastly, as a general rule, a murmur with either sound distinct at *c* and *d* is semilunar; if distinct at *e* and *f* it is auricular.

775. The indication afforded by abnormal sounds heard over the heart and large vessels may often be confirmed or corrected by placing the hand upon the wrist, at the same time that the ear is applied to the seat of the abnormal sounds. In the case of abnormal sounds attributed to disease of the auriculo-ventricular valves, if the sound precede the pulse, we may attribute it to the entry of the blood into the ventricle; if it is synchronous with it, to reflux. In this latter case, the presence of the venous pulse, that is to say, the pulsation o. the large veins on the right side of the neck, caused by regurgitation

of the blood into them, will indicate that the right side of the heart is the seat of the disease. Confirmation or correction of the indications thus obtained may also be derived from certain leading symptoms, such as the pulse, the respiration, the presence of hæmorrhages, dropsical effusions, &c. For instance, an irregular, unequal, and feeble pulse is commonly met with in disease of the mitral valve, but a full, hard, regular, thrilling pulse in disease of the aorta. Dropsical effusions are more common in disease of the right side of the heart, affections of the lungs in disease of the left side, and head symptoms in disease of the aorta.

776. The sounds heard in the position of the heart, from causes external to it, are friction sounds, generally double, and in rare cases triple or fourfold. They arise from depositions of coagulable lymph on the surface of the pericardium, or from other morbid formations in the same situation. These sounds, too, are of limited extent, and are not heard in the course of the large vessels. They resemble those produced by depositions of lymph on the surface of the pleura, and vary in intensity, from a sound closely allied to the *bruit de soufflet*, to the harsh creaking sound produced by the folding of new leather.

777. In cases of abnormal sound, the hand applied over the spot where the sound is heard, perceives a peculiar *thrilling vibratory motion*, resembling that felt on touching the back of a cat in the act of purring. This is called the purring tremor (*fremissement cataire*); a similar thrill is sometimes felt under strong pressure, in the healthy arteries themselves, after profuse loss of blood, and in anæmia. It is also present over aneurismal tumours, in aortic dilatations, in arterial varix, and in valvular disease admitting of regurgitation.

778. The most common sound in the blood-vessels remote from the heart is the bellows murmur in different degrees of intensity. This may always be produced both in the arteries and veins by the pressure of the stethoscope, but is most distinctly heard in chlorotic females, and after hæmorrhages. It is heard in the veins of the uterus during pregnancy, but may be produced by pressure of the stethoscope on the iliac veins.

779. The humming sound (bruit de diable) and the buzzing sound (bruit de mouche) are also heard in different states of the vessels, and may be produced in the large veins by the pressure of the stethoscope. They may be heard in most anæmic females by placing the stethoscope with a tolerably firm pressure in the supra-clavicular space; but they are not peculiar to anæmia. They are generally most distinct on the left side, but, in rare instances, they are perceptible only on the right side or only on the left.

780. This humming or buzzing sound is distinguished from sounds due to the motion of the blood in the arteries by being continuous. Sometimes, as in extreme cases of anæmia, a humming sound, due to the motion of the blood through the veins, is heard at the same time with a bellows sound caused by the motion of the blood through the

arteries. This combination is best heard in the space above the clavicles.

781. Other sounds heard in the blood-vessels are the peculiar whizzing or grating sound of aneurism, and a similar sound from the passage of blood through an accidental opening from an artery into a vein (aneurismal varix).

4. THE PULSE.

782. By the ear, or by the hand applied to the region of the heart, we may count the number, the force, the quickness, the regularity, and the degree of equality of its beats; but the pulse teaches us this and something more. It is a measure not only of the number, force, quickness, regularity, and degree of equality of the heart's contractions, but also of the quantity of blood sent forth at each beat. Hence it is a better measure of the circulation. It would be a perfect one were it not that the coats of the arteries vary in their degree of contractility. But this variation, while it impairs the value of the pulse as a measure of the circulation, gives it an additional claim to attention as a criterion of the state of the nervous system; for this it is which modifies the contractility of the arteries.

783. The fallaciousness of the pulse has passed into a proverb, and the proverb has furnished a good excuse for the neglect with which it has been treated. Substitute the word "difficult," for the word "fallacious," and we have a motive for industry instead of an apology for idleness. The pulse can only be fallacious to the extent to which we are ignorant of it; it will always remain difficult even to those who understand it best. The difficulties that attach to the subject are the same which beset every part of the study and practice of medicine, and they spring from the same causes—of which the chief are the original difference in degree existing between all the functions of the human body in health, the variable intensity of the causes of disease, and the numerous combinations of which those causes are susceptible.

784. Some precautions are necessary in examining the pulse, and some directions are required. The first precaution to be observed is, to wait a certain time till the emotions commonly occasioned by the presence of the medical attendant have subsided, for such emotions have a marked effect upon the circulation. The mode in which the pulse is felt is also of some consequence. For the purpose of counting the number of beats, a single finger may be used; but in order to observe the more minute changes which it undergoes, the four fingers of the opposite hand should be applied in the course of the radial artery, with a moderately firm and equal pressure. By compressing the artery with the ring or little finger, we can ascertain by the forefinger the degree of compressibility. In infants and very young children, it is often difficult to count the pulse at the wrist, and in these cases the beat of the heart should be preferred.

785. Of all the characters of the pulse, its frequency is that which is most easily ascertained. This usually corresponds with the number

of the heart's contractions; it can never exceed that number, though it may fall short of it. In certain forms of disease of the heart, the quantity of blood which the ventricles receive is so small, that it makes no impression on the mass of the circulating fluid, and the impulse does not reach the radial artery; or the heart contracts without having any blood in it; or some pressure, temporary or permanent, may exist in the course of the artery: in all these cases, the pulse is imperceptible, and we miss some of its beats. In syncope, too, all the beats of the heart are so feeble that no pulse can be felt at the wrist. These are some of the few exceptions to the rule that the pulse is an accurate measure of the frequency of the heart's contractions.

786. The number of the pulse in health varies with age, sex, and temperament; with posture, time of day, sleep, exercise, food, mental emotions; temperature and density of the air; quantity of blood contained in the system; and the strength and vigour of the frame. The principal information which we possess on these subjects is condensed in the following pages:—

787. AGE.—*Infancy.*—The frequency of the pulse is very variable in young infants. According to Quetelet, the numbers immediately after birth, both for males and females, are as follow:—

Maximum, 165; Minimum, 104; Mean, 135; Range, 61.

The following numbers are taken from Billard; the averages are approximations:—

	Max.	Min.	Mean.	Range.
1 to 10 days	180;	less than 80 (in 18)	106;	more than 100
1 to 2 months	150;	. . . . 70 . . .	103;	 80
1 to 3 months	100;	. . . . 70 . . .	87;	 30

Hence it appears that the pulse of the infant at birth, and for some time after, has a very variable frequency, and is little to be depended upon as a test of the state of the health.

788. From infancy till towards the middle of life, the pulse progressively diminishes in frequency, to increase again slightly in the decline of life. The following table, founded upon between 600 and 700 observations, of which the greater number were made by myself, shows the average and extreme numbers of the pulse, without distinction of sex, time of the day, or posture of the body. The number of observations at each age was either 20 or 25:—

Age.	Max.	Min.	Mean.	Range.
1	158	108	128	50
2	136	84	107	52
3	124	84	106	40
4	124	80	105	44
5	133	80	101	53
6	124	70	95	54
7	128	72	90	56
8	112	72	92	40
9	114	65	87	49

Age.	Max.	Min.	Mean.	Range.
10	120	76	91	44
11	100	56	84	44
12	120	70	94	50
13	112	70	84	42
14	114	68	86	46
15	112	60	84	52
16	104	66	83	38
17	102	54	76	48
18	104	58	74	46
19	108	60	76	48
20	106	52	72	54
21	99	59	74	40
22	96	41	68	55
23	100	60	74	40
24	84	52	71	32
25	88	59	73	29

789. The following table presents the number of the pulse at different ages, deduced from an average of twenty-five observations at each age specified. All the observations were made in apparently healthy persons, fasting, in a state of rest, in the middle of the day, and in a sitting posture:—

AGE.	MALES.				FEMALES.			
	Max.	Min.	Mean.	Range.	Max.	Min.	Mean.	Range.
1 week,	160	104	128	56	160	104	128	56
2 to 7 years	128	72	97	56	128	70	98	58
7—14	108	70	84	38	120	70	94	50
14—21	108	60	76	48	124	56	82	68
21—28	100	53	73	47	114	54	80	60
28—35	92	56	70	36	94	62	78	32
35—42	90	48	68	42	100	56	78	44
42—49	96	50	70	46	106	64	77	42
49—56	92	46	67	46	96	64	76	32
56—63	84	56	68	28	108	60	77	48
63—70	96	54	70	42	100	52	78	48
70—77	94	54	67	40	104	54	81	50
77—84	97	50	71	47	105	64	82	41

790. The pulse of the adult male, then, may be stated at 70, that of the adult female at 80; the highest number is somewhat less than 100 in the adult male, and somewhat more than 110 in the adult female; the least number in each is about 50. The range (the difference between the highest and lowest numbers) extends from 28 to 56 in the male, average 43; and from 32 to 68 in the female, average 48.

The lowest number recorded in the table is 46; the lowest observed by Floyer was 55.

791. Much lower frequencies have, however, been met with in healthy persons. Heberden records 42, 30, and even 26 beats in a man of 80; Fordyce, 26, in an old man in the Charter-house; in a young man whose pulse is not included in the table, as he laboured under slight dyspepsia, I have repeatedly counted as low as 38 beats; and this is the lowest I have met with in many hundreds. Pulses as low as 16 or even 14 beats are on record, but it is doubtful whether the persons in whom they occurred were healthy. Falconer has observed pulses of very low frequency in women, viz., one of 36 and another of 24; and Dr. Graves mentions one of 38.

792. In disease, extraordinary low frequencies of the pulse have been observed: one case is reported by M. Piorry, in which it beat 17 times in a minute; in a case of epilepsy, by Sir W. Burnett, the number was 14: and in a remarkable case of injury to the upper part of the spine, followed after an interval by fits of syncope with convulsions, the pulse was usually about 33, but fell during the fits to 12, 10, 8, "and at three or four different times, when the patient was quite insensible, and not in a fit," seven and a-half in a minute.* These low frequencies of the pulse are generally little affected by stimuli, and, as in the case reported by Dr. Graves, remain unaltered by febrile attacks.

793. It is extremely probable, on the other hand, that exceptions may exist to the frequency of the healthy pulse, of an opposite kind—that is, cases of great frequency; but I have not met with any well-authenticated instances. In disease, extraordinary frequencies of pulse have been counted. Dr. Joy has counted 200 in a case of acute hydrocephalus, and I am credibly informed by a medical man, a near neighbour of my own, that during occasional violent fits of palpitation he has counted in his own person 250 beats in the minute, and that a medical friend who called to see him in the fits corroborated his statement as to the number. Heberden counted a pulse of 180, though Floyer thought that the greatest number which could be distinctly counted was 140. I have myself counted upwards of 170 in a case of phthisis; and in a case of typhus fever, occurring in a boy ten years of age, and during the rapid formation of diffused abscess of the arm, I distinctly counted 264 beats in the minute, being nearly nine beats in two seconds.

794. *Sex.*—It will be seen by comparing the two columns of the foregoing table, that the pulse of the female has nearly the same frequency as that of the male up to seven years, but that at more advanced periods of life the female pulse is in excess by from 6 to 14 beats, the average excess being 9 beats. The pulse, too, has a greater range in the female than in the male; that is to say, there is a greater difference between its highest and lowest numbers. This happens in consequence

* Medico-Chir. Trans. 1841; Reporter, Mr. Holberton, of Hampton.

of the female pulse being much more frequent in many instances than the male, whilst in others it falls nearly as low.

795. As it is not easy to bear in mind the number of the pulse in the two sexes for the several periods specified in the tables, the following approximative figures may assist the memory:—

At birth . . .	140
Infancy . . .	120
Childhood . . .	100
Youth . . .	90
Adult age . . .	75
Old age . . .	70
Decrepitude . .	75-80

Assuming these to be the numbers for the male, an addition of about 10 beats will have to be made to the last three lines to give the numbers in the female.

796. *Temperament.*—Nothing is known with certainty of the influence of temperament on the pulse. It is probable that the pulse is more frequent in the sanguine and nervous than in the lymphatic and bilious; but I have counted a pulse of 50 in a youth under 20 years of age, with all the marks of the sanguine temperament.

797. *Posture.*—In the healthy adult male the mean frequency of the pulse in the different postures is as follows:—

Standing, 79; sitting, 70; lying, 67; including all exceptions to the rule.

Standing, 81; sitting, 71; lying, 66; excluding all exceptions to the rule.

In the adult female of the same mean age the numbers are,—

Standing, 89; sitting, 82; lying, 80; including all exceptions to the rule.

Standing, 91; sitting, 84; lying, 80; excluding all exceptions to the rule.

798. The extremes are very remote from these mean numbers. Thus, in the male, the difference between standing and sitting has been observed as high as 26, and as low as 0; that between sitting and lying as high as 18, and as low as 0; and that between standing and lying as high as 44, and as low as 0. In the female, in like manner, differences scarcely less marked have been observed. Numerous exceptions also exist to the rule that the pulse is more frequent sitting than lying, and standing than sitting. All these facts should be borne in mind at the bedside. The effect of change of posture on the same frequency of the pulse is nearly twice as great in the male as in the female, and nearly three times as great in adults as in early youth.

799. The effect of change of posture increases with the frequency of the pulse, as is seen in the following tables:—

MALES.

	51–70	71–90	91–110	111–130
Standing	61	81	101	120
Sitting	55	68	82	93
Lying	52	67	74	81
Difference between standing and lying	9	15	27	39

FEMALES.

	61–80	81–100	101–120
Standing	71	92	108
Sitting	67	85	97
Lying	63	83	90
Difference between standing and lying	8	12	18

800. The exceptions to the general rule also decrease as the frequency of the pulse increases, and for the higher frequencies of the pulse entirely disappear. The effect of change of posture on the same frequency of the pulse is greater in the morning than in the evening. When the head is placed lower than the body the pulse falls.

801. The cause of the different frequency of the pulse in different postures is the different amount of muscular contraction required to support the body in those postures.

802. The effect of change of position is much increased by debility; it is greatly diminished in phthisis pulmonalis. The pulse is said by Dr. Graves to be unaffected by posture in hypertrophy of the heart; but this statement requires confirmation.

803. *Period of the day.*—The pulse of the healthy male, as a general rule, is more frequent in the morning than in the evening, and diminishes progressively as the day advances. To this rule there are many exceptions in males, and still more in females. The pulse also falls more rapidly and uniformly in the evening than in the morning. It is also a general rule that exciting causes of all kinds act more powerfully in the morning than in the evening.

804. In experiments made upon my own person, I found that the *effect* of the same food on the same frequency of the pulse was, taking

one experiment with another, nearly twice as great, and lasted more than three times as long, in the morning; whilst in more than one instance the same food which in the morning raised the pulse from 5 to 12 beats, and kept it above its natural number for one or two hours, produced no effect whatever in the evening. This fact has an important bearing on the administration of food and remedies in disease.

805. *Sleep.*—The pulse falls considerably in sleep. In Quetelet's observations, there was a difference of 10 beats in an adult female, the same difference in a girl from three to four years old, and in a boy from four to five years a difference of 16 beats. Sleeplessness excites the circulation.

806. *Exercise.*—Muscular exertion increases the frequency of the pulse more than any other cause. It may raise it to upwards of three times its natural frequency. Change of posture is but a particular case of this. After severe and long-continued exertion, as I have ascertained experimentally, the pulse suffers the same collapse as the other functions, and falls much below its natural number. Passive exercise also excites the pulse.

807. *Food.*—The pulse is but little affected by vegetable food, more by animal substances, and most of all by warm drinks. Spirituous liquors and tobacco, even though used habitually, increase the frequency of the pulse. Cold liquids lower it.

808. *Mental emotions.*—These have a marked effect on the pulse, the exciting passions increasing its frequency, the depressing passions lowering it. The apprehension which patients feel in the presence of their physician is well known to excite the pulse, and the caution to wait till the excitement has ceased before the pulse is counted is as old as Celsus.

809. *Temperature of the air.*—Cold air lowers the pulse, warm air excites it. In Sir C. Blagden's experiments, in which he exposed himself during eight minutes in air heated to 260°, the pulse was 144, or double its natural frequency.

810. *Density of the air.*—On the summit of Mont Blanc, De Saussure found the pulses that beat 49, 66, and 72 times respectively at Chamounix, raised to 98, 112, and 100.

811. *Quantity of blood contained in the system.*—The pulse is more frequent in that degree of plethora which falls short of overloading the heart with blood; its frequency is but little increased where the heart is oppressed. Compression of the arteries raises the pulse by producing the first degree of plethora. A slight diminution of the quantity of blood lowers the frequency of the pulse; a considerable diminution raises it.

812. *Debility.*—In debility without disease the pulse falls, but its frequency is increased in extreme debility, or where debility is complicated with irritation.

813. The more common causes of increased frequency of pulse in healthy persons, then, are the following:—muscular exertion, active and passive exercise, a change from a posture requiring less muscular effort to one requiring more exertion, food (especially warm drinks, spirituous liquors, and tobacco), a high temperature, diminished pressure of the air, extreme debility, sleeplessness, the first degree of plethora, and exciting passions and emotions.

814. The principal causes of diminished frequency, on the other hand, are,—sleep, fatigue (provided it be not carried to excess), continued rest, debility without disease (provided the debility be not extreme), depressing passions, cold applied externally or taken internally, increased atmospheric pressure, a change from the standing to the sitting, or from the sitting to the recumbent posture, and the inverted position of the body.

815. Other characters of the pulse, besides its frequency, deserve notice. The pulse of the healthy male may be described as regular, moderately full, compressible, and rising rather slowly under the finger; that of the female is smaller and quicker in the beat, as is also the pulse of the child. The pulse of persons of a sanguine temperament is full, hard, and quick; that of the lymphatic temperament, slower in the beat. In old age the pulse is often rendered hard by the increased firmness of the arteries.

816. Exceptions also occur in healthy persons to the regularity of the pulse, instances having been observed in which the pulse was irregular or even intermittent in health, and regular in disease, resuming its intermittent character on recovery. In some persons this irregularity occurs on every slight attack of indigestion, especially where much flatulence is present.

817. The frequency of the pulse, then, though a point of much importance, is by no means the only one which demands the attention of the practitioner; there are other characters of at least equal value. The following description and explanation of them will be found useful:—

818. The impression communicated to the finger by the pulse is compounded (*a*) of the beat of the heart, (*b*) of the reaction of the aorta and large vessels, (*c*) of the condition of the coats of the artery itself, (*d*) of the consistence of the blood, and (*e*) of the state of the aortic valves.

819. (*a*) The characters of the pulse which depend upon the degree and mode of the heart's contraction are the following:—

Number of the heart's contractions.—Pulse *frequent, infrequent.*

Regularity of the heart's contractions.—Pulse *regular, irregular, intermittent.* (This last term should be applied to an arrest of the heart's action occurring at regular intervals.)

Quantity of blood expelled at each contraction of the heart. Pulse *large* (full), *small.* If the quantity sent out at each beat is the same, the pulse is *equal,* if different, *unequal.*

Time occupied by each beat of the heart.—Pulse *slow* (labouring), *quick* (sharp). An extreme quickness of pulse constitutes the *jerking* or *bounding* pulse of authors.

820. (*b*) The influence of the elastic reaction of the large arterial trunks on the pulse is shown in cases of dilatation of the aorta with loss of elasticity, and in aneurism. The firm and strong reaction of the healthy elastic coat produces a *steady* pulse; the absence of this reaction occasions the peculiar *thrilling* pulse of aortal disease and of aneurism. The degree of elasticity of the arteries themselves produces the following modifications:—

Elasticity of the arteries increased.—Pulse *hard* (strong, sharp, wiry, incompressible).

Elasticity of the arteries diminished.—Pulse *soft* (weak, yielding, compressible).

Elasticity lost in the large arterial trunks.—Pulse *jerking, thrilling, vibrating.*

821. (*c*) The character of the pulse is further modified by the degree of contractility of the muscular fibres which the coats of the arteries contain. This condition may be conveniently expressed by the word *tone*. It exists in every degree from the tense state of high nervous excitement or rude robust health, down to the flabby condition of collapse, shock, or extreme debility.

822. (*d*) The influence which the consistence of the blood has in modifying the pulse is best seen in extreme cases of anæmia, in which an important element of the blood being deficient, the pulse assumes the *thrilling* character which in other instances is due to a loss of elasticity in the great arteries.

823. (*e*) The state of the aortic valves has a very marked effect upon the pulse. In their healthy state they contribute by their prompt closure to keep the arterial system full of blood, and thus conduce to the steady character of the pulse. But when the valves are diseased in such a manner as to prevent their closure, and to allow of regurgitation into the left ventricle, each pulse is peculiarly distinct, the wave occasioned by the contraction of the ventricle being felt as if the blood were 'shot under the finger,' the vessel in the interval being unusually empty. This pulse is an exaggeration of the *jerking* pulse of anæmia.

824. The foregoing characters of the pulse are rarely, if ever, met with separate, but admit of various combinations, of which the following are the most important:—

Pulse *frequent, large, soft.*—(Compounded of a frequent beat of the heart, a large quantity of blood sent out by each contraction, and an artery wanting in elasticity and tone.) This pulse accompanies the premonitory stage of many febrile and exanthematous diseases, such as scarlatina, cynanche tonsillaris, erysipelas, the first stage of pneumonia, &c. It is also present in dilatation of the left ventricle of the heart.

Pulse *frequent, large, hard.*—(Compounded of a frequent beat of the heart, a large quantity of blood sent out at each beat, and an artery full of elasticity and tone.) The pulse of the first degree of plethora and of hypertrophy with dilatation of the heart.

Pulse *rather frequent, large, slow* (labouring).—(Compounded of a rather frequent and a slow beat of the heart, and a large quantity of blood sent out at each contraction.) The pulse of a greater degree of plethora, the heart overloaded with blood.

Pulse *frequent, large, hard, quick.*—(Compounded of a frequent and quick beat, a large circulation of blood, and an artery full of elasticity and tone.) The pulse of inflammatory fever.

Pulse *frequent, large, hard, thrilling.*—(Compounded of a frequent beat of the heart, a large quantity of blood sent out at each beat, the artery at the wrist elastic and full of tone, with a loss of elasticity in the larger arterial trunks.) The characteristic pulse of aneurism and of dilatation of the aorta, without obstruction to the flow of blood.

Pulse *frequent, small, quick.*—(Compounded of a frequent beat of the heart, a quick contraction, and a small quantity of blood sent out at each beat.) This is the characteristic pulse of phthisis in males, and of anæmia in females. In a moderate degree, indeed, it is the character which distinguishes the female pulse, and which is present in an exaggerated form in all the less severe disorders of the female. This pulse, with the addition of extreme hardness or tension, is the pulse of hypertrophy with contraction of the heart.

Pulse *unequal* and *irregular, frequent* or *infrequent.*—(Compounded of a variable quantity of blood sent out at each contraction, and of contractions performed in unequal times.) As the quantity of blood sent forth by the heart may depend upon one of two causes,—a diminished supply from the auricle, or a want of power in the heart to send forth all the blood which it receives,—this pulse may indicate mitral valve disease, or atrophy or softening of the heart. It may depend, also, on causes which render the supply of blood to the left auricle variable. Hence it occurs in some diseases of the lungs. A similar pulse may occur suddenly as the consequence of the formation of a large polypus in the left ventricle, or as the result of pressure exercised upon the heart by serous effusion in pericarditis.

Pulse *infrequent, large, hard.*—(Compounded of an infrequent beat of the heart, a full supply of blood, and an artery in a state of elasticity and tone.) A pulse often met with in apoplexy before depletion has been practised, in hydrocephalus, in compression of the brain, in narcotism, and in simple hypertrophy of the left ventricle.

Pulse *infrequent, quick.*—(Compounded of an infrequent and a quick beat of the heart.) A pulse sometimes met with in the hysteric female, and in very rare cases of pulmonary consumption in the male.

825. These are some of the many combinations of the chief elements,

so to speak, of the pulse. They are given partly as examples of the employment of terms, and partly as hints to those who may wish to follow out the study of the pulse.

826. Taken in combination with other symptoms, the pulse furnishes important indications in all diseases; whilst in some cases of frequent occurrence, as phthisis pulmonalis and affections of the heart, it often forms the earliest clue to the existence of an obscure and lurking malady.

827. It must not, however, be supposed that the pulse is free from the uncertainties which attach to all the symptoms of disease. On the contrary, we encounter, from time to time, remarkable exceptions to general rules. There are no characters of the pulse, for instance, more generally present than those which have just been pointed out as peculiar to phthisis in the male subject; but among some hundreds of cases conforming to the rule of increased frequency, we now and then meet with a single case in which the number falls short even of the average in health. I have met with two such cases; in one of which the pulse was only 64 in the erect posture. Though it is possible that the patient's pulse in health might have been even less than this, it is probable that it formed a real exception to the rule. It may be well to state that the dyspeptic patient referred to at § 791, as having a pulse of 38, died several years afterwards of pulmonary consumption. It is also well known that in other diseases and states of system usually characterised by great frequency of pulse, curious exceptions do occasionally take place. Thus there have been epidemics of typhus fever characterised by a very low frequency of pulse; and cases of all the more severe febrile disorders marked by the same curious exceptions to the rule. Thus, Dr. Wells counted a pulse of 58 in a boy eight years of age, suffering from anasarca after scarlatina.

828. It ought also to be understood that the pulse in disease is subject to great variations in the same person, either within short intervals of time, or in states of system in other respects apparently the same. Thus, it is not uncommon in typhus fever to find the pulse varying in a few hours from 40 or 50 beats to 120 or 130; and in one of the two cases of phthisis just referred to, the pulse which was 64 in one attack of the disease was 120 in a second attack, not distinguishable from the first by any other symptom.

829. Besides the simple characters of the pulse already mentioned, others of less frequent occurrence, and of more obscure nature, have been mentioned by authors, of which the following are examples. The redoubled pulses (*dicrotus, bisferiens, bisiliens*), when two strokes, follow each other rapidly, and are separated from the two succeeding beats by a pause—a pulse which is said to indicate approaching hæmorrhage; the *incident* pulse (*incidens, inciduus*), when the second pulsation is weaker than the first, the third than the fourth, after which there is a stroke as strong as the first, and so on: this is the critical

pulse of the old writers; the *pulsus caprisans*, admirably named, but rarely felt; it consists in a small pulse, succeeded after a short interval by a large one, conveying the impression of an unsuccessful effort, followed by the overcoming of an obstacle.

5. THE RESPIRATION.

830. The number and character of the respiratory movements, and the relation which they bear to the state of the circulation, frequently engage our attention at the bedside. In order to appreciate rightly the value of this sign of disease, it is necessary to bear in mind that the muscles of respiration are under the control both of voluntary and involuntary nerves, and that their subordination to the will renders them liable to all those affections of the voluntary muscles in which volition is suspended or impeded. Hence they are affected in hysteria, in chorea, and in tetanus.

831. As the muscles of respiration are subject to the influence of the will, it is necessary, in experiments or observations upon the number and character of the respirations, to avoid this source of fallacy. I have succeeded in accomplishing this purpose by the invention of an instrument which registers the number of respirations during a considerable interval, without requiring any attention on the part of the experimenter. (See § 696.)

832. At the bedside, the same object may be secured when the patient is lying down, by resting his hand on the abdomen as if with a view of counting the pulse. By relaxing the grasp upon the wrist, and allowing the hand to rise and fall with the movements of the abdomen, the number of respirations may be counted. In this manner the interference of the will, which is always called into play when the attention of the patient is attracted to the breathing, is avoided. By this means, too, the pulse and respiration may be counted in succession, and compared with each other. This precaution of holding the wrist while the breathing is being counted should be observed even when the respirations are audible, and we are counting them by the ear.

833. *Number of the Respirations.*—The number of the respirations is subject to at least as great variety as that of the pulse, and has been still less inquired into. Little is hitherto known on the subject beyond a few rude estimates. The number of respirations in a minute is usually stated at 18, or about one to every four beats of the pulse. It is variously stated by authors for the adult male at from 14 to 26 respirations in a minute.

834. The respiration, like the pulse, varies in frequency with age, sex, posture, and time of day; and is subject to great change during sleep.

835. *Age and Sex.*—Quetelet has made some interesting observations on the respiration at different ages, in males and females. The

following table presents the results which he obtained from about three hundred observations on males, and a smaller number on females:—

AGE.	*Number of the Respirations.* MALE.	FEMALE.
At birth	23 to 70	27 to 68
5 years	32	..
15—20	16 to 24	19
20—25	14 to 24	17
25—30	15 to 21	..
30—50	11 to 23	19

836. The range of my own respiration, from my twenty-eighth to my thirtieth year, as founded upon numerous experiments, with the self-registering instrument, in different postures and under different circumstances, was 12 to 22.

837. Vierordt obtained, as the result of observations on his own person, in the *sitting* posture, a maximum of 15, a minimum of 9, and an average of 12. Hutchinson, in experiments on 1,714 healthy males in the same posture, found a minimum of 6 respirations, and a maximum of 41; while the greater number were found to breathe 20 times in the minute, and a very considerable proportion between 16 and 24 times. It is probable that the highest numbers observed in Dr. Hutchinson's experiments occurred in men who had recently taken exercise. The lowest numbers are of very rare occurrence, and may perhaps be explained by the difficulty of counting the respiration accurately in any posture except the recumbent, and by any means except the pressure of the hand on the abdomen. The recorded frequency of respiration in the persons of the principal experimenters on that function ranges between 14 and 27.

838. *Posture.*—The results of a large number of observations, made on my own person, by the self-registering instrument already referred to, were as follows:—For a pulse of 64 the respirations were, standing, 22; sitting, 19; and lying, 13. Hence the rule which the pulse follows—viz., that the difference between standing and sitting is greater than that between standing and lying, is inverted in the case of the respiration. The respiration in the sitting posture, for different frequencies of pulse, ranged from 15 to 21.

839. *Period of the day.*—The rule of the pulse is also inverted in respect to the influence of the time of the day, for whereas the pulse becomes less frequent as the day advances, the respiration increases in frequency. On comparing the same frequency of pulse morning and evening, I find that there are about 18 respirations in the evening for 17 in the morning. The same rule obtains in disease in both sexes, even in those cases where the pulse becomes more frequent in the evening. That degree of debility, therefore, which fatigue occasions

both in health and disease, is accompanied by increased frequency of respiration.

840. *Sleep.*—Quetelet has examined the effect of sleep on the respiration. In a woman in her twenty-seventh year he found the respirations to be, awake, 27; asleep, 21. In two young children, the differences were 5 and 8 respectively. It appears from his experiments, that the respiration is more affected by sleep than the pulse.

841. The other causes which in health affect the frequency of the pulse, produce the same, or a similar effect, on the respiration. Thus, all causes which increase the frequency of the pulse and the force of the circulation, augment the number of the respirations. On the other hand, all causes of diminished frequency of pulse also lower the respiration. Thus, exercise increases the number of respirations, rest diminishes them: high temperatures increase the frequency both of the pulse and breathing, cold diminishes the frequency of both. Sleep, which lowers the pulse, has a still more marked effect upon the respiration. The only exception to the rule with which I am acquainted, is that of debility. It has been already stated, that debility without disease, provided it be not extreme, is accompanied by an infrequent pulse; the number of respirations, on the contrary, is increased in every degree of debility.

842. *Proportion which the respiration bears to the pulse.*—This has been variously estimated by authors. Quetelet, Burdach, Hutchinson, and the majority of physiologists, estimate the number at 1 to 4; Joy (Lib. Pr. Med.) and Dr. C. Hooker (Boston Medical and Surgical Journal, 1838) at 1 to $4\frac{1}{2}$; Floyer at 1 to 5. No dependence can be placed on any of these estimates, as they were formed in ignorance of the effect of posture on the breathing. In experiments on my own person, made with the self-registering instrument, the proportion has varied between 1 to 2·60 and 1 to 5·23. In the sitting posture, but for different frequencies of the pulse, it has varied from 1 to 2·61 to 1 to 5·00.

The chief causes of this difference are the posture of the body, the time of the day, and the frequency of the pulse itself.

843. *Posture.*—For a pulse of 64, the proportion of the respiration to the pulse, standing, was 1 to 2·95; sitting, 1 to 3·35; and lying, 1 to 4·97.

844. *Time of day.*—The proportions morning and evening for the same frequency of the pulse are about 1 to 3·60 and 1 to 3·40.

845. *Frequency of the pulse.*—The proportion which the respiration bears to the pulse decreases as the pulse increases. Thus for a pulse of 54, the proportion was 1 to 3; for a pulse of 72, it was 1 to 4. As a general rule, the number of respirations increases with that of the pulse, but in a less rapid ratio, the proportion which the respiration bears to the pulse decreasing as the pulse increases. Further *observations* may slightly modify these and other statements, founded

upon my own observations, but it is believed that they will be found in the main correct.

846. In disease, the number of the respirations varies within much wider limits than that of the pulse. The smallest number which I have counted is 6 in a female in a deep sleep, but not comatose, after attempting suicide by laudanum; and I have counted as few as 10 respirations in a case of paralysis. On the other hand, I have reckoned as many as 44 in a case of phthisis, 73 in a case of paralysis agitans, and 140 in a case of hysteric asthma. Floyer met with 60 respirations in a case of suffocative catarrh, and in a case of inflammation of the lungs in a child: on the other hand, he counted as few as 7 in more than one attack of asthma. Dr. Graves has recorded as small a number as 12, and as many as 50, in cases of fever. In Dr. Hutchinson's table (Medico-Chirurgical Transactions, vol. xxix., p. 226), among 1,714 observations on healthy adults in the sitting posture, one is recorded in which there were only 6 respirations in a minute!

847. With regard to the proportion which the respiration bears to the pulse in disease;—Floyer found it as high as 1 to 2 in a case of suffocative catarrh, and as low as 1 to 14 in a case of asthma; Dr. Graves has observed as high a proportion as 1 to 2 in one case of fever, and as low a proportion as 1 to 20 in another. In the case of paralysis agitans already referred to, I counted a pulse of 72 and 73 respirations; in the case of hysteric asthma, 144 pulses and 140 respirations; in a case of transposition of the heart, 32 respirations to 46 pulses; and in a case of paralysis, 1 respiration to $6\frac{1}{2}$ pulses. In a case of aneurism of the heart reported by Mr. Peacock (Prov. Med. Jour., No. 4, vol. ii.), there were 34 respirations to 33 pulses.

848. These remarkable variations in the number of the respirations as compared with that of the pulse are readily explained, if we reflect that the respiration is influenced by many other causes besides the quantity of blood sent to the lungs by the heart. Some of these causes are internal and some external. The principal internal causes are the state of the lungs themselves, and of the pleuræ by which they are invested. Among external causes are mechanical obstructions to the entrance of air, as by the pressure of tumours upon the air-passages, constriction of the chest, increased or diminished action of the muscles of respiration, &c. All these obstructions to the free play of the lungs, and the due performance of respiration, accelerate the breathing; and this acceleration, whether accompanied by a feeling of uneasiness or not, has been called dyspnœa. As this is the principal symptom of all diseases of the lungs, and a concomitant of a great majority of the diseases of the heart, it will be useful to present the chief causes of it in a tabular form.*

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* A similar table is given by Dr. Williams in Lib. Pr. Med. vol. iii. p. 25. Some use has been made of it in forming this scheme.

CAUSES OF INCREASED FREQUENCY OF RESPIRATION.—DYSPNŒA.

I. *Quantity of blood in the lungs increased.*

- *a.* With quickened circulation. — Exercise, repletion, plethora (1st degree), inflammatory fevers, hypertrophy of the right side of the heart, &c.
- *b.* With obstacle to the return of blood to the heart. — Diseases of the mitral valve, pressure on the pulmonary veins, &c.

II. *Quality of the blood altered.*

- *a.* More venous than usual. — Morbus cœruleus, &c.
- *b.* Red particles deficient. — Anæmia, chlorosis.

III. *Deficiency of oxygen in inspired air.*

- *a.* Air pure, but small in quantity. — Air rarefied by high temperature, or diminished atmospheric pressure.
- *b.* Air defective in quality. — Non-poisonous gases, as nitrogen and hydrogen.

IV. *Mechanical obstructions.*

Internal.

- *a.* Of the air tubes. — Diminished size of air tubes from thickening of their parietes, or from pressure, and accumulations of mucus, as in the death-struggle.
- *b.* In lungs themselves. — Congestion, hepatization, œdema, tubercle, &c.; emphysema, dilated bronchi, vomicæ, &c.
- *c.* In pleural sac. — Hydrothorax and pneumothorax, pleuritic effusions and adhesions.
- *d.* Caused by other organs. — Enlargement of the heart or large vessels, aneurismal tumours.

External.

- *a.* In parietes of the chest. — Malformations and distortions, ossification of cartilages, &c.
- *b.* In abdomen. — Enlarged viscera, tumours or dropsical effusions.

V. *State of the muscles of respiration.*

- *a.* Paralysis (partial). — Injuries of the spinal marrow, in the neck, &c.
- *b.* Debility. — From fatigue, from exhaustion, after severe febrile affections, and at the approach of death.
- *c.* Pain
  - 1. In muscles. — In intercostals, diaphragm, or abdominal muscles, the sound muscles performing the respiratory movements.
  - 2. In surrounding parts. — In the abdomen in peritonitis, and in the chest in pleuritis, the muscles which cause the least pain acting alone.
- *d.* Spasm. — Tetanus, hydrophobia, &c.
- *e.* Other forms of augmented innervation. — Strong mental emotions; hysteria, asthma.

849. The chief causes of diminished frequency of the respiration are sleep and coma, however produced, whether by narcotics or by pressure on the brain. The respiration, therefore, is infrequent in apoplexy, and in poisoning by opium and carbonic acid.

850. Many other characters of the respiration, besides increased frequency, merit attention; as the full or deep, the small or feeble, the equal or unequal; the regular or irregular; the short, quick, and catching; the long, the labouring; the thoracic, the abdominal, the diaphragmatic, &c.

851. There is a peculiar state of the respiration, combining apnœa with unequal breathing, which is worthy of notice from its observed association with fatty degeneration of the heart. The patient, after remaining in a state of apnœa for a quarter of a minute or more, has a feeble respiration followed by a succession of breathings increasing in force up to a maximum of strength, and then as gradually diminishing. This peculiar respiration has been described by Drs. Cheyne, Stokes, and Sibson.

852. Increased or diminished frequency of the respiration taken alone is of comparatively little value; it is only when combined with observations on the pulse, or examinations of the chest by percussion and auscultation, that we learn its real signification. Thus, a frequent respiration, taken alone, may arise from any one of the many causes specified in the table; but a frequent respiration with an infrequent pulse, in the ascertained absence of any disease of the internal organs of the chest, would strongly indicate great debility, or, in the absence of this, hysteria. On the other hand, an infrequent pulse and respiration combined would as probably arise from some disease or injury of the brain or of the upper portion of the spinal marrow. Again, a frequent and quick respiration, in the absence of disease of the internal organs of the chest, and accompanied by acute pain of the parietes of the chest or abdomen, is at once explained by the existence of that pain, whether its seat be in the muscles or in the peritoneum.

853. Important indications may also be obtained by noting the number of the respirations day by day in acute diseases. In pneumonia, for instance, a daily diminution in the number of the respirations, with or without a similar change of the pulse, gives the best hope of recovery; in apoplexy or in narcotic poisoning, on the contrary, an increase in the number of respirations, especially if accompanied by an increased frequency of pulse, may be considered as a good symptom. So in convalescence from fever, where there is great debility, a diminished frequency of respiration, with a gradual increase in the number of the pulse, is a sign of returning strength.

854. In making use of these, as well as of the less important symptoms and signs of disease, the observer should always be on his guard against the common error of trusting too implicitly to any one sign, however valuable in itself, to the neglect of others which are capable of affording him useful information. In diseases of the chest, for instance, neither the stethoscopic signs, nor the respiration, nor the pulse alone, can furnish the practitioner with all the information of which he is in want; but if, knowing the exact value of each of these signs and the fallacies which attach to each, he makes use of all of

them at the same time, there are few difficulties in diagnosis which he will not be able to overcome.

6. OTHER SYMPTOMS AND SIGNS OF DISEASE.

855. In addition to the signs and symptoms of disease so minutely examined in the first five divisions of this chapter, there are several others of which it is easier to recognise the importance than to arrange them in a manner free from objection. Some of them, as the expression of the countenance, the appearance of the tongue, and the presence or absence of pain, are subjects of observation and inquiry in every case of disorder or disease without exception; while others, as the appearance of the sputa, or of the discharges from the alimentary canal, are noted only, or chiefly, in diseases of the lungs, or of the primæ viæ. Yet these symptoms of larger import associate themselves very naturally, in many cases, with symptoms of very limited application—*e. g.*, the appearance of the tongue with that of the lips and gums in anæmia; so that it seems reasonable to group them together, and to treat of them in connection with each other. Accordingly, the symptoms and signs which still remain to be examined will be treated in this section under the distinct heads of—1. The organs of digestion. 2. The organs of circulation. 3. The organs of respiration. 4. The urinary and genital organs. 5. The nervous system. 6. The expression of the countenance, and the condition and attitude of the body.

856. (1) THE ORGANS OF DIGESTION.—The condition of the alimentary canal is revealed to us in part by the state of the tongue; in part by alterations in the functions of the stomach and intestines, such as nausea, vomiting, and purging; and in part by the character of the matters rejected from the stomach and bowels.

857. The value of the *tongue* as a symptom or sign of disease, and an aid in diagnosis and prognosis, will be readily understood if it is borne in mind that it consists of a dense mass of muscular fibre, largely supplied with blood, covered with a secreting membrane, and lying in a bath formed of the secretions of the mouth and salivary glands. It may, therefore, be expected to furnish indications of the state of the muscular and nervous system, of the circulation, of the function of secretion generally, and of the character of the secretions in other parts of the body, and especially of the state of the alimentary canal, to which it may be said to belong by continuity of membranous covering, and as subserving the function of mastication.

858. The tongue does not present the same appearance in all healthy persons. In some it is habitually clean, in others slightly furred; in some florid, in others pale; in some compact and firm, in others flaccid and indented by the teeth; in some it is protruded in a relaxed state, in others strongly contracted and drawn to a point. Even in the most healthy persons it is covered with a thin white fur in the morning before taking food, and those who sleep with the mouth open awake with *a perceptible* dryness of the tongue.

859. In disease, the tongue presents a great variety of appearances. As to *size*, it is swollen in inflammation of the organ itself, in severe diseases of the adjacent parts, in salivation from mercury, and in malignant diseases; on the other hand, its size is diminished where much emaciation is present. The swelling of the tongue from any of these causes is accompanied by indentation where it is in contact with the teeth, an appearance which the tongue also wears in that relaxed and flabby state which often accompanies great debility. The *form* of the tongue varies with the mode in which it is protruded; but as a general rule, it is small and pointed in "irritation," broad and flabby in states of debility. The *temperature* of the tongue is low in syncope and apnœa, and, in common with the breath, undergoes a very marked decrease of temperature in epidemic cholera. Its *colour* coincides, to a certain extent, with that of the general surface of the body. Thus it is florid in plethora; pale after profuse discharges of blood, in anæmia, in allied states of system, and in many chronic wasting maladies; and livid in apnœa and in certain diseases of the heart and lungs which greatly affect the respiration. The colour of the tongue also depends upon the state of the digestive organs. Thus it is universally red, or red at the tip or at the edges, or in both situations, in some cases of acute inflammation of the mucous membrane of the stomach and intestines. It is also morbidly red and tender in some forms of fever, in some cases of scarlatina, and in typhus fever, after the disappearance of the fur. A smooth red tongue, sometimes known as a "glazed" tongue, is often present in fever accompanied by great irritation of the stomach and bowels, and in idiopathic affections of those organs. In acute inflammation of the throat, the tongue may also assume a deep-red colour. In poisoning by the mineral acids it is stained of characteristic colours, and its epithelial covering partially or wholly removed.

860. Much importance attaches to the condition of the tongue in respect of *moisture*. As the tongue of a healthy person is kept moist by the secretions of the lining membrane of the mouth, and by the saliva, it becomes dry when those secretions fall short of the quantity requisite to supply the loss by evaporation and that which from time to time passes down the gullet in the act of swallowing. It is obvious, therefore, that the tongue must afford a valuable index of the state of the secreting organs, and of the condition of the circulation, as promoting or retarding the proper functions of those organs. Accordingly a dry tongue will indicate a state of circulation unfavourable to secretion in other organs as well as in the tongue and mouth; and such a tongue exists in inflammatory and febrile states of system. On the other hand, a moist tongue indicates a favourable state of the secretions generally, and an absence of any high degree of inflammation or fever; and it is obvious that a transition from a dry to a moist tongue must always be a favourable sign. Hence, in cases of fever, the physician carefully inspects the tongue, examines it by the touch, and hails a moisture appearing at the edges, and gradually extending

to the centre, as a sign of the more free state of all the secretions, and a mark of approaching convalescence. Again, a moist and flabby tongue, indented by the teeth, is justly regarded as a sign of want of tone and vigour, and an indication of a state of circulation favourable to secretion from other organs as well as from the mouth.

861. A *fur* collects upon the tongue in almost all severe diseases. Thus the tongue is covered with a white creamy fur in the first stage of fever, in catarrh, in quinsy, in most severe inflammations, and in acute rheumatism. In more advanced stages of fever, a thick brown or black coating collects, or the tongue is dry, parched, and tender. A thick, black, dry fur, with black *sordes* about the teeth, is seen in the worst stage of typhus fever, and in low typhoid conditions of the system, and coincides with a highly impure state of the blood, with unhealthy secretions, and fetid discharges from the bowels. A brown dry fur exists in cases of local irritation, the tongue becoming moist as the irritation subsides. In jaundice, the fur is sometimes tinged with bile, and in scurvy it is blackened by the effused blood. In dyspepsia, the appearance of the tongue is very variable. Sometimes a thick fur collects at the base of the tongue, while the tip and edges are of a bright red; sometimes the fur extends over the whole surface, and is accompanied by indentations formed by the teeth, by deep cracks, longitudinal or transverse, or by partial abrasions of the epithelium. Deep foul ulcers of the tongue, with hard borders, are not uncommon consequences of syphilis. In many cases of constipation the tongue is covered with a brown fur; in others it presents no unusual appearance.

862. A very peculiar and characteristic appearance is presented by the tongue in most cases of scarlatina. The papillæ are elongated and florid, and protrude through a white coating of fur; or, the tongue itself being of a bright-red colour, and free from fur, the papillæ appear distinct on a red ground. In the first case the resemblance is very close to a white, in the second to a red strawberry.

863. In common with the lining membrane of the mouth and throat, the tongue may be the seat of small superficial ulcers, known as *aphthæ*. These ulcers are of frequent occurrence in infancy, when they constitute the "thrush," and they are also common in the last stage of pulmonary consumption, and of occasional occurrence in other chronic visceral diseases towards their fatal termination.

864. The mode in which the tongue is *protruded* is often characteristic. It is tremulous in extreme debility, or under the influence of fear, as also in cases of idiopathic fever with debility. It is protruded with difficulty when dry; slowly and hesitatingly in diseases accompanied by stupor, in which cases it is withdrawn after an interval, and as if in consequence of deliberation. In partial paralysis the tongue is protruded either towards the sound or the affected side of the face.

865. *The gums*, from their proximity to the tongue, may be men-

tioned here, though they afford signs rather of the state of the circulation than of the digestive organs. The gums are florid in plethoric states of the system; pale in anæmia; livid in cases where the function of respiration is much impeded; swollen and dark in scurvy and purpura hæmorrhagica, in which diseases they bleed on the slightest touch; swollen with an inflamed line in cases of salivation; marked with a blue line at the margin of the teeth in poisoning by lead.

866. The *lips* and lining membrane of the mouth, like the gums, inform us as to the state of the circulation. They are pale in anæmia. They are also dry and parched where the tongue is similarly affected. Aphthæ occur on all these parts as an idiopathic affection, especially in young children, and towards the close of febrile and inflammatory affections. An herpetic eruption on the lips is a common accompaniment of severe catarrh, and is often useful as a diagnostic mark.

867. The *teeth* afford some indications worth attending to. In early life they attract attention during dentition as the source of much suffering, of severe febrile symptoms, of marked disturbance of the functions of the alimentary canal, of convulsions, and of eruptive diseases. In later life, the soundness of the teeth may be looked upon as an indication of vigour of constitution, and their early decay as one of the marks of feebleness of constitution. Caries of the teeth may, however, be induced by habitual and severe indigestion, by the excessive use of acids and sugar, and by the abuse of mercury. Persons who handle mercury in their trades are also subject to chipping of the teeth. The teeth grow loose in scurvy, and during salivation with mercury. They are covered with dark brown or black sordes in typhus and in typhoid states of system. *Grinding* of the teeth during sleep is common in children suffering from worms or other intestinal irritation, especially when the brain is affected; and *chattering* of the teeth accompanies the severe shivering fits which usher in many febrile disorders, and form part of the paroxysm of ague.

868. The *fauces and tonsils* are subject to chronic inflammation and swelling, and the *uvula* to relaxation, which may be taken as indications of want of constitutional vigour. The same parts are the seats of inflammation in scarlet fever, and in severe attacks of catarrh, and of ulceration in secondary syphilis. The tonsils themselves are liable to intense inflammation and great enlargement in quinsy, and they are the seat of a painful chronic irritation in persons who use the organs of speech unskilfully.

869. *The saliva.*—An increased flow of saliva is a symptom worthy of observation, sometimes as the result of irritation of the salivary glands through inflammation of the mouth and parts adjacent, sometimes as the consequence of dentition in children, and of the irritation set up by unsound teeth in the adult; sometimes, again, as one of the effects of certain active medicines, such as mercury, iodine, antimony, and their preparations, of prussic acid and digitalis. The salivation occasioned by the *preparations of* mercury is attended by soreness of

the gums, a brassy taste in the mouth, and a peculiar fœtor, which serve to distinguish it from a mere increase in the flow of saliva; also by a febrile disturbance known as the *mercurial erethysm*. An increased flow of saliva from any cause is designated salivation, or ptyalism. Frothing at the mouth, due in part to an increased secretion of saliva, and in part to increased mucous discharge from the air-passages, is a common symptom of epilepsy and hydrophobia. In epilepsy the froth is, as it were, churned out of the mouth by the convulsive movements of the muscles of the tongue, mouth, and lips; while in hydrophobia it is forcibly spit out between the closed teeth.

870. *The taste.*—The sense of taste is more or less impaired in all diseases in which the tongue becomes dry or furred. It is also probably impaired in apoplectic seizures. A bitter taste is often present in jaundice, and on waking in the morning in persons suffering from feverish attacks, or from severe dyspepsia, and it may be caused instantaneously by strong mental emotion. Consumptive patients often complain of the salt taste of their sputa, and a putrid taste is present in diseases in and about the mouth attended by decomposition. Some dyspeptic patients also complain of a taste as of rotten eggs; and a brassy or coppery taste is one of the signs of mercurial salivation.

871. *The appetite.*—A loss of appetite (anorexia) and distaste for food (nausea) are among the earliest symptoms of indisposition, and the most constant attendants of severe illness; while, on the other hand, a restoration of the appetite is among the earliest indications of convalescence. A failing appetite, again, is an unfavourable symptom in chronic maladies, and in advanced age; but it may be caused in persons not suffering from disease by want of exercise and fresh air, and also by depressing passions. A voracious appetite (bulimia) is an occasional result of irritation of the stomach, or of irritation of the intestines from worms; and it is sometimes a disease of itself, not easily traced to its true cause. It is also often present in children suffering from mesenteric disease, in whom that part of the food which should have nourished the body is prevented from entering the lacteals. A voracious appetite is also a common occurrence during established convalescence, obviously as a means of repairing the wasting of the body during the previous illness. In some cases it is associated with frequent vomiting of food, as in inflammation attacking the stomach near the pylorus. A depraved appetite (pseudorexia) is not uncommon in pregnant females, in chlorosis, and in hysteria. It is also present in some forms of insanity.

872. *Thirst* is a common symptom of disease. It is present in active inflammations, and in violent febrile attacks, in consequence, probably, of the tongue, mouth, and throat partaking of the vascular fulness of the whole system, and suffering from an inconvenient and distressing dryness. It also occurs in accidents and diseases attended by a sudden loss of blood, or a rapid outpouring of some important secretion. Accordingly it is present in profuse hæmorrhages; *in diarrhœa*, dysentery, and cholera; in diabetes; in some forms *of dropsy*; and in cases of phthisis attended with profuse perspiration.

In healthy persons it always follows on violent exercise, and it is the most urgent suffering of the soldier on the march, and of the wounded on the field of battle. Thirst is also a consequence of the overloading of the blood with saline matters, as in the sailor fed on salt meat, and, in a less degree, in persons who indulge in condiments in excess; and it is a leading symptom of poisoning by arsenic, and by poisons belonging to the class of irritants. An excessive desire for liquids is known as *polydipsia*.

873. *The odour of the breath.*—The rapidity with which liquids having a strong and peculiar odour of their own, or imbibing such an odour from the solid portions of the food with which they are mixed, pass from the stomach into the circulation, and being carried to the lungs taint the breath, makes the odour of the breath a point of some importance. Thus the odour of spirits sometimes enables the medical man to discriminate between the effects of intemperance and an apoplectic seizure. A foul breath is also among the symptoms of dyspepsia, of that unhealthy condition of the body known as *cachexia*, of salivation, of advanced stages of fever, of scurvy, and generally of inflammations in and about the mouth, attended by decomposition of the secretions; or followed by gangrene of the solid parts. It is accordingly present in gangrene of the mouth, and in caries of the teeth. On the other hand, an extremely offensive state of the breath is sometimes to be traced to the lungs, as in gangrene of those organs. The breath has been observed to have the odour of honey in saccharine diabetes.

874. The value of *vomiting* as a symptom of disease can only be duly appreciated by bearing in mind that the stomach is not merely the chief organ of digestion, but a viscus in close nervous relation with the brain, heart, and lungs. The contents of the stomach may therefore be rejected, not merely in consequence of disorder or disease in the stomach itself, but also in consequence of severe injury or disease affecting the more important organs of the body, or of shocks affecting the nervous system more especially. Among the causes affecting the stomach and intestinal canal may be mentioned, simple overloading of the stomach; irritating food; inflammation of the mucous membrane of the stomach, by whatever cause produced; obstruction to the passage of the food through the pylorus, as in cancer of the stomach; permanent obstruction to the passage of the fæces through the intestines, as in ileus and strangulated hernia; and inflammation of the entire alimentary canal, as in English and Asiatic cholera. Vomiting is also a common effect of poisons belonging to the classes of irritants, and of narcotico-acrids, and sometimes attends poisoning by the pure narcotics, and especially poisoning by the narcotic gas, carbonic acid. It is also a not uncommon effect of chloroform. To the more indirect and remote causes of vomiting belong concussion of the brain, the condition of the brain preceding an apoplectic seizure, and inflammation of the substance and membranes of the brain. Vomiting, again, accompanies the passage of gallstones, and is commonly present in severe inflammation of the *kidneys*, of the heart, and of the womb.

It is also one of the most constant symptoms of pregnancy, and is of very frequent occurrence in delicate females. Lastly, vomiting is often among the earliest premonitory symptoms of severe attacks of the febrile exanthemata, and particularly of small-pox.

In vomiting dependent on diseases of the stomach and bowels, it is important to note the time after a meal at which the vomiting shows itself. Thus, as a general rule, vomiting following immediately, or after a very short interval, on the reception of food, is generally to be attributed to inflammation of the mucous membrane of the stomach itself. If the food is rejected after having remained in the stomach an hour or more, the cause of the vomiting may be traced, with great probability, to the pylorus or duodenum. If the vomited matters do not consist of food, this inference will not hold good. When, instead of a single act of vomiting ushering in an attack of illness, the vomiting recurs again and again, it must always be looked upon as an unfavourable complication. From this statement, however, the case of pregnancy must be excepted.

875. *Vomited matters.*—We are often assisted in our diagnosis by the examination of the matters rejected from the stomach. In gastritis the food itself is returned nearly unchanged almost directly it is swallowed; when discharged after an interval more or less considerable, and more or less completely digested, it may be in consequence of ulcer in the stomach, or of malignant disease of that organ. The longest interval occurs in disease of the duodenum, when the food is discharged fully converted into chyme. Clear acid liquids are vomited after an interval of from half-an-hour to two hours or more in the disease known as gastralgia or gastrodynia. Bile regurgitates from the duodenum, and is discharged by vomiting, in functional and organic diseases of the liver. Blood is often discharged in very large quantities in the disease known as hæmatemesis; generally of a dark colour, clotted, and mixed with food; rarely of a florid hue, as in hæmoptysis. The blood so discharged may flow from the general surface of the stomach, or from one or more ulcers in the mucous membrane; or it may regurgitate through the pylorus from the duodenum. A discharge of florid blood in large quantities may be the result of an aneurism bursting into the stomach. Purulent, or mucopurulent matter, may in like manner be discharged from the stomach in case of an abscess of some neighbouring viscus opening into that organ. Fæculent vomiting is a symptom of mechanical obstruction of the lower portion of the intestinal canal, or of a fistulous communication existing between the stomach or upper portion of the small intestines and the colon. In a highly acid state of the contents of the stomach, a scanty vomiting of mucus, or of a clear acid liquid, abounding in small round black flakes, is a common occurrence. Such vomited matters, when placed under the microscope, are found to contain the *growths* described by Goodsir as *Sarcinæ Ventriculi*.

Fig. 44.



876. The *bowels* are variously disordered; sometimes confined, from torpor, from the absence of their natural stimulus, from mechanical obstruction, or from the operation of the poison of lead; sometimes relaxed, from inflammation of the mucous membrane, whether caused by previous constipation, unwholesome food, purgative medicines, or irritant poisons. Diarrhœa is also a common consequence of ulceration of the intestines in typhus fever; it is a frequent occurrence in pulmonary consumption, uniformly present in advanced stages of tabes mesenterica, very prevalent during the heats of summer, and an occasional consequence of a change of residence from cold to hot climates, and from low situations to elevated ones. Strong mental emotions also sometimes give rise to diarrhœa. In union with vomiting it constitutes English and Asiatic cholera, and is present in almost all cases of irritant poisoning. Frequent scanty discharges of mucus, pus, or blood, with great tenesmus, constitute the disease known as dysentery.

877. The alvine discharges may consist of mucus, tenacious lymph, or pus, as in inflammations of the mucous membrane of the canal, the nature of the secretion depending on the degree of the inflammation; or they may consist of blood poured out by the vessels of the intestines generally, by those of the large intestines exclusively, or by the enlarged veins of the rectum (piles). They may consist chiefly of ill-digested food, which happens in tabes mesenterica, or they may contain an unusual quantity of fat, as in disease of the pancreas.

878. The evacuations may be pale from the absence of bile; unusually yellow from its excess; green, as often happens in children; dark and offensive, from the long retention of feculent matter, or from morbid secretions of the liver. They often contain portions of hardened fæces or scybala. They assume an unusually yellow colour under the use of mercurial preparations; mineral acids in large doses impart to them a green colour; and preparations of steel turn them black, as does also the admixture of blood in considerable quantity.

It is important in all doubtful cases to distinguish those discharges which flow from the general surface of the intestines from such as are the product of local disease in the rectum. When, therefore, pus or blood is discharged with the motions, and the symptom is not promptly relieved by proper aperient medicines, the rectum should be examined for piles or fistula, or, if florid blood is poured out in considerable quantity, for a bleeding artery laid bare by ulceration.

879. We may often derive important aid to a sound diagnosis from comparing the discharges from the stomach with those from the bowels. Thus, obstinate constipation with vomiting of feculent matter, implies mechanical obstruction, as in strangulated hernia; while vomiting of feculent matter, accompanied by a discharge of imperfectly-digested food (*lientery*), goes far to justify the inference that a fistulous opening exists between the stomach or beginning of the small intestines and the colon (ileo-colic fistula).

880. (2.) THE ORGANS OF CIRCULATION.—The most important

symptom and sign of disease connected with the circulation is the pulse, which has already been minutely examined in a former division (4) of this chapter; and some indications of the state of the *capillary circulation* have also been considered when speaking of the gums, lips, and lining membrane of the mouth. Similar indications of the state of the circulation through the small vessels, and of the full or empty state of the vessels generally, may be derived from the appearance of the skin, which is pale after severe losses of blood, in anæmia, in leucocythemia, and in analogous states of system, universally florid in plethora, of a brighter or duskier red, in patches of greater or less extent, in the febrile exanthemata, livid in diseases of the heart and lungs, attended with imperfect aeration of the blood, and yellow in jaundice, from the retention in the blood of bile which ought to have been eliminated by the liver. The languid states of the circulation which supervene in old age are marked by dark discoloration of the skin of the legs, and habits of intemperance often betray themselves by a permanently mottled state of the skin of the face, with streaks and spots of dark-red on a yellow ground. The weakened condition of the capillaries in sea and land scurvy, and in the advanced stages of typhus fever, reveals itself in small round spots (petechiæ), or larger effusions of blood beneath the skin. The fulness of the vessels, whether from plethora, inflammation, or congestion, may be distinguished from effusions of blood by the test of pressure, which blanches the skin when there is mere fulness of the vessels, but does not alter the appearance of the skin when the colour is due to effusion of blood.

881. *The veins* sometimes supply, by their distended and swollen state, useful aids to diagnosis. When, for example, the sounds heard on applying the ear or stethoscope to the region of the heart lead us to infer the existence of valvular disease, but leave us in doubt as to the particular valve affected, a visible pulsation in the jugular veins accompanying each beat of the heart indicates regurgitation of the blood through the imperfectly closed *tricuspid* valve. When the swelling of the vein is considerable, and the pulsation very distinct, we have a further indication that the walls of the right ventricle are thickened. In cases of rare occurrence a visible pulsation is communicated to the veins by the transmission of the heart's impulse through the capillary vessels. This is called the venous pulse, and is a sign of an unusually strong action of the heart. This true venous pulse requires to be distinguished from the lifting of a vein by the force of the artery lying beneath it. The veins of the surface of the body sometimes become greatly distended and highly varicose from the closure by pressure, or diseases of some deeper-seated venous trunk.

882. (3.) THE ORGANS OF RESPIRATION.—Though the number of the respirations and the proportion which they bear to the number of the pulse, as well as the respiratory movements generally, have been examined with unusual minuteness in a former part (5) of this *chapter*, several symptoms and signs of disease, due to a disturbance

in the functions of the lungs, remain to be considered. There are certain respiratory movements, for instance, such as sighing, yawning, sneezing, and coughing, to which may be added the form of inspiration known as stertor, deserving of notice as signs of disease. The changes which the pulmonary secretions undergo in disease, and the odour and temperature of the breath, also claim attention in this place. The signs derived from the altered character of the respiratory movements may be divided into the two heads of *noisy inspiration* and *noisy expiration*.

883. *Noisy inspiration.*—In healthy persons the air is drawn into the chest, and expelled from it noiselessly; but there are diseases which are accompanied and characterised by peculiar inspiratory sounds. The long loud whooping inspiration following the complete emptying of the lungs by a succession of violent expirations, or coughs, is familiar to us as the pathognomonic sign of hooping-cough; laryngismus stridulus is recognised by the peculiar *crowing* character of the inspirations; and croup by a similar inspiratory sound compared to the crowing of a cock. Attacks of spasmodic and humoral asthma, again, are marked by the loud wheezing or whistling which accompanies each drawing in of the breath. *Stertor, stertorous breathing*, or snoring, is another form of noisy inspiration which owes its origin to the flapping of the soft palate when partially paralysed, as in sound sleep, or completely paralysed, as in congestion of the brain, or what is commonly termed pressure on the brain. Accordingly it is present in apoplexy, and in compression and concussion of the brain; and it is one of the group of symptoms which constitutes *coma*. *Sighing* and *yawning* admit of being classed under this head. They are forms of deep and audible inspiration, which, as a general rule, indicate the previous imperfect performance of the function of respiration, such imperfection resulting, in some cases, from a deficient supply of nervous power; in other cases from congestion of the lungs; in others, again, from a slight mechanical impediment to the complete expansion of the chest. There is a deficient supply of nervous influence shown by yawning on the approach of sleep, after great fatigue and exhaustion, in an unoccupied state of body and mind, and under the dominion of depressing passions, to which sighing affords relief. Yawning is also a prominent symptom in many nervous affections falling short of well-defined disease, and it is a symptom attendant upon the accumulation of urea in the blood. In the congestion of the lungs which follows recovery from asphyxia, after fainting fits, and during hysterical attacks, sighing and yawning are common occurrences. Under the head of mechanical impediments inducing yawning or sighing as supplementary to the ordinary movements of respiration, may be specified the restraint of stays in women, and in either sex the accumulation of flatus in the stomach hindering the downward movements of the diaphragm. Either of these mechanical impediments may bring on hysterical paroxysms in persons predisposed to them. Another form of noisy inspiration *is hiccough*. This is characterised by

the shortness of the inspiratory movement, which affects chiefly the diaphragm. It is nearly allied in character to that common expression of grief, *sobbing*. Hiccough is often experienced to a painful degree in the act of eating, especially when the food is swallowed hastily. It is also a symptom of inflammation of the diaphragm, or of those viscera, or parts of viscera (such as the liver, pancreas, duodenum, or cardiac extremity of the stomach), which are in contact with it, or lie adjacent to it. Tumours pressing upon the pneumo-gastric nerve are sometimes the cause of obstinate hiccough. This symptom is also frequent towards the termination of many acute maladies, when it must be looked upon in a very unfavourable light.

884. *Noisy expiration.*—Sneezing and coughing are the two forms of noisy expiration deserving of notice as symptoms and signs of disease. Sneezing consists of a violent expiration forcing the air through the nostrils, following upon a deep and full inspiration. It either serves to clear the nostrils of some cause of irritation, or it marks the swollen and painful state of the lining membrane which ushers in attacks of catarrh and of measles. It is a symptom of longer continuance in the disease known as hay-asthma. It is also one of the group of symptoms which marks the poisonous action of iodide of potassium. In common with other violent movements of the muscles of respiration, it may occur as a symptom of hysteria. *Coughing* is a violent expiratory effort by which the air-passages are freed from offending matters, as the nostrils are cleared by the act of sneezing. The contents of the air-tubes thus expelled are said to be *expectorated*, and the act of expulsion is called *expectoration*. The matters themselves are known as *sputa*.

There are many different kinds of *cough*. A cough may be *dry*; that is to say, unattended by expectoration; or *moist*, that is to say, accompanied by *sputa*. The dry cough may be due to irritation of the pulmonary branches of the pneumo-gastric nerve, or to the pressure of tumours and morbid growths on some part of the air-passages. Hence a dry ringing cough of long continuance will sometimes indicate the existence of aneurism of the aorta. A dry cough is also present in the early stage of inflammations affecting the air-tubes, when the blood-vessels are in that state of fulness unfavourable to secretion. This happens at the onset of attacks of catarrh, influenza, and croup, and in the first stage of humoral asthma. A dry cough is also one of the results of dyspepsia, of obstinate constipation, and of intestinal worms; and a loud, dry, barking cough is recognised as one of the symptoms of hysteria. The cough in incipient phthisis is either dry or attended with scanty expectoration at long intervals, as on rising in the morning. An inflamed state of the fauces, with enlarged tonsils and relaxed uvula, is another cause of a dry cough. Inflammation or ulceration of the larynx and trachea also gives rise to a troublesome dry cough, or one attended with a very scanty expectoration. When the seat of the disease is the upper part of the *larynx, the* dry cough is accompanied by a hoarse voice. A short, dry

cough, attended with acute pain in the side, is one of the symptoms of pleurisy. When a dry cough, as often happens, comes on in paroxysms, it is called a *spasmodic* cough; such a cough may be often traced to inflammation of the liver, or to biliary obstruction, or to a diseased state of some viscus situate near the diaphragm. But coughs accompanied by free expectoration, when occurring in paroxysms, are also termed spasmodic. A *moist* cough, or a cough accompanied by expectoration, is of more common occurrence than the dry cough. Such a cough is present in catarrh, in bronchitis, in confirmed phthisis pulmonalis, in hooping-cough, in pneumonia, in gangrene of the lungs, and in hæmoptysis.

885. The *expectoration*, or *sputa*.—The fluids coughed up from the lungs often furnish us with very important information; but that we may interpret them aright, we must bear in mind, in the first place, the fact, that substances spit out, or otherwise rejected from the mouth, may consist of the secretions of the mouth and throat, of the nostrils, or of the lungs, as well as of the secretions and contents of the stomach; and it is not always easy to ascertain, from the descriptions of a patient, from which of these parts the matters submitted to our inspection have been supplied. When, for instance, the fluid consists wholly or chiefly of blood in considerable quantity, it is not always easy to ascertain whether it come from the lungs by an almost imperceptible cough, or from the stomach by a very easy act of vomiting; when, on the contrary, the quantity of blood in the sputa is small, it may be equally difficult to determine whether it was hawked from the throat or coughed from the lungs. In young children the expectorated matters are generally swallowed.

886. Having ascertained that the matters submitted to our examination have been coughed up from the lungs, we should have to consider their quantity, both absolutely and relatively to the time occupied in their discharge, as well as their quality. As a general rule, a continuous and abundant expectoration, especially if coughed up with ease, may be regarded as favourable, as far, at least, as the present state of the patient is concerned. Such an expectoration exists in the moist stage of common colds, in chronic bronchitis, in confirmed phthisis, and in hooping-cough.

887. On the other hand, a scanty expectoration ushers in all acute attacks of disease of the lungs, though it also exists in the first stage of a common cold, and throughout the first or incipient stage of pulmonary consumption. A scanty expectoration is a concomitant of the first onset of a fit of humoral asthma, and of the first stage of pneumonia. Again, a transition from a scanty to a more abundant secretion may be looked upon as a favourable symptom, just as the reverse indicates a relapse or increase of disease of the lungs. When a scanty secretion, coughed up with difficulty, is streaked with blood, it may be taken as evidence of great congestion, or active inflammation of the

lungs. Again, a copious sputum brought up in one act or fit of coughing has a significance of its own. It shows either a previous accumulation of the discharged matter in some cavity of the lungs, or in some neighbouring viscus, or a very rapid outpouring of the same from a considerable tract of the mucous membrane of the lung itself.

888. The quality or character of the sputa often supplies us with an important aid to diagnosis, and the changes of character which occur in the course of the same illness are especially deserving of attention. The sputa may consist of unmixed mucus of various degrees of consistence (as in catarrh, bronchitis, and pleurisy); of a thin watery mucus (in some cases of early phthisis); of a tenacious, gelatinous mucus, mottled with small round brown or black spots, and full of air-bubbles (in the stage of humoral asthma immediately following the dry stage); of a stringy tenacious brown or rust-coloured mucus (in the first stage of pneumonia); of mucus tinged or streaked with dark blood (in the acme of a fit of humoral asthma, in acute pneumonia, and in some cases of phthisis pulmonalis); of mucus blended with pus (in fullydeveloped catarrh, in bronchitis, and in confirmed phthisis). Again, the expectorated matters may be wholly or chiefly *purulent*, the pus consisting of the contents of a cavity in the lungs, suddenly or gradually discharged; or of the sac of the pleura, through a fistulous opening into the lungs; or of an abscess in the liver, in this latter case deeply tinged with bile. Expectoration of *blood*, in larger or smaller quantity, is also a common occurrence in disease.

889. There are few cases of pulmonary consumption in which this symptom does not happen; and it must always furnish a strong presumption in favour of the existence of that disease. A scanty expectoration of blood may, however, occur in pneumonia, in acute bronchitis, and in the fit of asthma; and a copious and rapid discharge of blood by coughing in the rare disease known as bronchial polypus, and in aneurismal tumours communicating with the air-passages, as well as in confirmed pulmonary consumption. The colour of the blood, the matters with which, if not pure, it is mixed, and the mode of its discharge, should always be carefully inquired into, as it may be of great importance to distinguish the copious hæmorrhage from the lungs, in hæmoptysis, from the equally copious discharges of blood in hæmatemesis. The sputa have sometimes an extremely offensive odour. This may arise from the decomposition of the retained secretions of the air-passages, or it may indicate destruction of the substance of the lung, as in gangrene of its texture.

890. The sputa are sometimes submitted to *microscopical examination*. When they are of such consistence as to allow of it, it is advisable to detach their external portions by washing them lightly in water, as extraneous matters from the mouth are apt to be mixed with *them*. Small portions of the mass may then be covered by thin glass

and examined. In this way we may recognise the fibres of the elastic tissue of the air-cells, indicating a destruction of the substance of the lung, as in phthisis and gangrene of the lung (Fig. 45); casts of the minute air-tubes, as in pneumonia and bronchial polypus; and the small granular matter of tubercle in phthisis. The sputa in this disease are frequently found to be made up of semi-transparent round, oval, or triangular spots, consisting of small granular cells (*tube cle corpuscles*), mixed with free granules and oil-globules. Sometimes, also, the sputa in phthisis contain fragments of mixed phosphate and carbonate of lime, which effervesce on the addition of an acid.

Fig. 45.



891. (4.) THE URINARY AND GENITAL ORGANS.—The urine itself has been minutely examined in a previous section of this chapter. The indications afforded by the mode of passing the urine remain to be considered. It may be voided with difficulty (dysuria), or with an extreme of difficulty, attended by acute suffering at the neck of the bladder (strangury). The slighter degrees of dysuria are sometimes caused by pressure, or by irritation, propagated from a neighbouring organ. An accumulation of fæces in the rectum, or the irritation of worms, constitute causes of dysuria readily removed by a brisk aperient. Enlargement of the womb, as in advanced pregnancy, or irritation of the vagina, as in acute gonorrhœa, will produce the same symptoms in the female. Inflammatory affections of the rectum, such as dysentery, will also occasion it; and the irritant poisons cause it, partly by the inflammation set up in the rectum, partly by the irritating quality imparted to the urine. Two poisons especially, cantharides and turpentine, possess the property of inflaming the whole urinary system, and exciting strangury, with painful erections of the penis in the male, and excitement of the genital organs in the female. Frequent and painful micturition may also be occasioned by a highly acid state of the urine, by gravel, and by the poison of scarlatina in the course of its elimination by the kidneys. Affections of the bladder itself, such as inflammation (the offspring sometimes of catarrh, sometimes of gonorrhœa extending from the urethra), ulceration, spasm, and fungous growths, may give rise to the same symptom; or the cause of it may be traced to similar affections of the urethra, to stricture, to enlargement of the prostate, or to the passage of calculi.

892. *Retention of urine*, arising from an obstacle to the discharge of urine actually secreted, must be distinguished from *suppression of urine* (ischuria), the effect of disease of the kidney, putting a stop to the secretion altogether. Retention of urine is sometimes the consequence of continued over-distension of the bladder, exhausting the power of the muscular coat; sometimes of disease of the spinal cord, causing paralysis of the coat; sometimes, probably, to a loss of sensibility of the part through disease of the brain, or extreme functional

disorder of the nervous centres, as in typhus fever and in typhoid states of the system. Spasm of the neck of the bladder is another cause of retention of urine. It bears its part in the retention produced by want of opportunity to void the urine; and it sometimes occurs in hysterical females. In many cases the cause of retention is mechanical. The seat of the obstruction may be either in the ureter (as in the passage of a calculus from the kidney), or in the canal of the urethra from the same cause, or from enlargement of the middle lobe of the prostate, or from the pressure of a tumour external to the canal.

893. *Suppression of urine* (Ischuria renalis) means a cessation of the secretion of the kidneys. This may occur in consequence of idiopathic inflammation of the kidney, or of inflammation produced by poisons belonging to the class of irritants, especially cantharides and corrosive sublimate. It may also occur after scarlet fever; and it is a symptom of Asiatic cholera. Congestion of the kidney, without inflammation, may also occasion it. The effect of prolonged suppression is great drowsiness, passing gradually into coma.

894. The *sexual organs of the male* occasionally furnish useful indications. A troublesome irritation of the glans penis and prepuce, with frequent erections (priapism), characterises stone in the bladder. Erections, without the irritation of the extremity of the organ, may also occur from congestion of the kidney, from irritation at the neck of the bladder, or from inflammation of the canal of the urethra. Painful erections, with curvature of the organ, constitute the most troublesome symptom of gonorrhœa. Priapism is also one of the marked symptoms of poisoning by cantharides; and it may attend poisoning by other active poisons of the irritant class. Erection of the penis, with a discharge of the prostatic fluid, and an expulsion of fæces, may also be mentioned as a not uncommon occurrence in death by hanging and decapitation, in poisoning by prussic acid, and in other forms of sudden and violent death.

895. The *sexual organs of the female* are subject to a variety of diseases, some of which are deserving of notice as symptoms or concomitants of other diseases or disorders of the system. Anæmia, for instance, is often accompanied by amenorrhœa, as is the opposite state of plethora, though less frequently. Certain mental disorders, again, especially some forms of instinctive mania, and some varieties of monomania, are found associated with amenorrhœa, or with dysmenorrhœa, as also with the change of life. The importance attached to this function by patients, and the occasional association of disorders of menstruation with constitutional disturbance, and especially with hysteria, render it expedient for the medical man to inquire into the state of the uterine functions in all the cases that come under his care. The suppression of the menstrual discharge, the enlargement of the breasts, and the change in the appearance of the areola, the change in the shape and size of the abdomen, and certain changes in the uterus itself, have great importance in the practice of the accoucheur.

896. (5.) THE NERVOUS SYSTEM.—The symptoms and signs of disease which have to be treated under this head consist of *a.* altered sensation, *b.* altered muscular action, or *c.* altered mental phenomena.

897. (*a*) *Altered Sensation.*—All the organs of sense may suffer in three ways. The sensation of which they are the seat may be blunted or lost, heightened or perverted. The muscles also, and those viscera of the body which are not organs of sense, and which, in health, perform their proper functions with an entire absence of sensation, may become, through disease, highly sensitive, and, in common with the organs of sense, be the seat of acute pain. Again, all parts of the body, whether endowed with sensibility or not, may manifest pain on the application of pressure, or on being stretched much beyond their usual state of tension. On account of the universal importance of pain as a symptom of disease, it must take precedence of all other affections of the organs of sense.

898. *Pain.*—In estimating the value of pain as a symptom of disease, we have to consider its degree, its character, its seat, its extent, its duration, its persistence or otherwise, and its concomitants. In estimating the *degree* of pain, it is necessary to bear in mind the difference of expression used by different patients in describing pain, according as they have more or less general sensibility, more or less fortitude, and more or less honesty of purpose. The lesser degrees of pain are usually expressed by such words as slight, moderate, bearable; the greater degrees are spoken of as acute, intense, severe, violent, excruciating, agonising, distracting, intolerable. The only general principle of practical importance which can be laid down in respect of degrees of pain is, that the most acute pain is often occasioned by causes that entail the least danger to life; while, on the contrary, the lesser degrees of pain are often present in diseases of a far more formidable character. It ought also to be borne in mind that there are states of system which exaggerate pain, as there are states which tend to conceal it. Thus, in hysteric females, pain is often unduly acute; in typhoid and lethargic states of system, the reverse.

899. The *character* of pain is subject, in common with the degree of it, to considerable variety, and it gives some assistance in tracing it to its source and assigning its true cause. A *dull, obtuse, aching* pain is a common feature in congestions and sub-acute inflammations, and even in acute inflammations of soft and yielding parts and organs of the body. There is a dull, aching pain in the right side in congestion of the liver, in the loins in congestion of the kidney, and in the head, back, and limbs, at the onset of severe febrile attacks. A higher degree of the dull aching pain is present in periostitis, in rheumatism, in gout, and in the milder forms of neuralgia, when it is distinguished as a *gnawing* pain. A *burning* pain is often present in severe inflammations, as a combined result of heat and tension. A *throbbing* pain is present in inflamed parts subject to pressure, as in the common whitloe, and also in all abscesses similarly circumstanced. Pain in parts of the intestinal canal is commonly described as *griping* or twisting. In

scirrhous tumours, and in neuralgia, the pain is designated as *shooting*, *cutting*, *darting*, *lancinating*.

900. The *seat* of pain sometimes affords useful indications by corresponding with the diseased part or organ which gives rise to it; and sometimes, also, by the part affected with pain being in connection with the immediate seat of the disease by the intervention of nerves more or less directly traceable from the one to the other. Thus, disease of the hip-joint occasions pain in the knee; stone in the bladder, pain in the glans penis (in the female, pain at the meatus urinarius); inflammation of the kidney, and calculus in the ureter, cause pain in the groin, thigh, and testicle; disease of the womb, pain in the loins; constipation, pain down the back of the thigh; inflammation of the loins, pain in the right shoulder; and disease of the heart, pain in the left arm, or down to the bend of both arms. Leucorrhœal discharges, and all causes which weaken the nervous and irritable female, give rise to pain in the left side; a tender state of the spinal cord, to superficial thoracic and abdominal pains; and irritation at the root of a sensitive nerve to pain in all the parts to which its branches are distributed. Some of these pains are called *sympathetic*.

901. Of the *extent* of pain it may be said, as a general rule subject to many obvious exceptions, that pain limited to one spot is more likely to indicate severe disease than pain of greater extent. The pains of muscular rheumatism are generally extensive, as are those which attack hysteric females. But, on the other hand, neuralgic pains are often limited to small spots, as the brow, or to single organs, as the testicle or mamma.

902. The *duration* of pain is a point of considerable importance, especially when taken in connection with the health of the patient. A pain of long continuance, not materially affecting the health, would probably be neuralgic; and in the female would be likely to be found in connection with other symptoms of hysteria. The *persistence*, or otherwise, of pain is also well worth attention. As a general rule, the pain in important local diseases is *continuous*, though liable to exacerbations, or, under the use of medicines, to abatement. In less important cases pains are *fugitive*, *wandering*, *shifting*. In one disease—brow-ague—the pain is *intermittent*, or *remittent*.

903. The *concomitants* of pain are also highly important. As a general rule, the pain of inflammation is increased by pressure, and the pain which has its seat in the muscles by motion of the part, or by brisk percussion with the points of the fingers; while neuralgic pains are independent of these causes, and the pains of colic are relieved by pressure. As a general rule, neuralgic, rheumatic, and gouty pains are compatible with health, or with only slight departures from it, while most other pains are associated with marked deviations from it.

904. *Diminished sensation.*—All the organs of sense may be the seat of sensibility blunted or lost; and as this impairment of sensation or *total loss* of it sometimes furnishes important indications, it will

have to be considered as it affects the senses of touch, sight, hearing, smell, and taste.

905. The *sense of touch* may be so impaired as to give rise to the sensation of numbness, which may be brought about by cold, by pressure on the trunks of the nerves, or by the local action of narcotic poisons. In the absence of cold and the use of narcotics, continued numbness would suggest the existence of pressure on the trunk of a nerve, or of some disease of the nerve itself, impairing but not destroying its function. Total loss of sensation in any portion of the body would be accounted for by stronger pressure or more severe disease of the nerve. Loss of sensation in the upper or lower extremities, or in the whole body, is an occasional accompaniment of muscular paralysis of the same parts. A loss of sensibility is also occasionally present in hysteric females, and may be brought about by narcotics and by mesmeric manipulations. In examining patients with a view to determine the presence or absence of sensibility, it ought to be borne in mind that strong contractions of the muscles may follow the irritation of the skin from reflex action, in the absence of sensation.

906. The *sense of sight* is very variously affected, not merely from local causes attacking the organ itself, but also in consequence of disordered or diseased conditions of the brain. Slighter and more transient affections of the sight are common in dyspepsia, and in slight febrile and other disturbances of the circulation. These slight and transient affections consist in dark spots (muscæ volitantes), or bright spots, or sparks, or brilliant colours (as seen by drowning or hanging persons), or in simple indistinctness of vision, or in a flickering motion, or in a double vision, as in the drunkard, or half vision of objects. Spectral illusions have already been considered at p. 122. A heightened sensibility of the retina, accompanied by a dread of light (photophobia), is a common symptom of many acute inflammations of the eye itself, and of inflammatory affections of the brain. It may be also present in cases of acute anæmia from loss of blood, and in hysteria occurring in weak and delicate females. The opposite state of permanently diminished sensibility of the retina is usually connected with disease of the optic nerve, or of that part of the base of the brain from which the nerve arises. Transient dimness of vision, or actual blindness, sometimes occurs from loss of blood, from excessive lactation, or from other exhausting discharges, and it commonly precedes the state of syncope.

907. *Squinting*, when not a permanent state, is often due to affections of the brain, and is to be regarded as an unfavourable symptom. It is a common occurrence in children as a consequence of disease of the brain, attended by convulsions; and the permanent squint of the adult is often referred to an affection of the brain in infancy or childhood.

908. The state of the *pupil* is a symptom of importance. As a general rule it is contracted in irritation of the brain, whether that irritation be due to inflammation of the organ or to other causes, and it

is also subject to extreme contraction in poisoning by opium. On the other hand, the pupil is apt to be dilated in congestion of the brain, without irritation, in hydrocephalus, in epilepsy, in some cases and stages of apoplexy, and in functional disorders due to remote causes, such as constipation and intestinal worms. It is also dilated in poisoning by belladonna, and by substances belonging to the class of narcotico-acrids, as well as by the local application of the more active members of this class. The pupil is also examined as a means of ascertaining the state of the retina. If it contracts freely on the admission of light, the retina has not lost its sensibility. Its non-contraction under the stimulus of light indicates a loss of sensibility in the nerve, and, in certain cases, of the entire nervous system. When the pupil of one eye is dilated while that of the other is contracted, cerebral disease may be presumed to be present, unless the difference can be traced to local disease of one eye. The state of the surface of the eye is used as a test of the state of the nervous system. If insensible to the touch, the nervous system generally may be assumed to be in the same state. Thus it is insensible in true epilepsy; but in the feigned disease responds to the touch.

909. *The sense of hearing.*—This sense is subject to analogous affections with the sense of sight—to ringing sounds (tinnitus aurium), to distinct musical notes, and to puffing sounds like the noise of a locomotive. All of these may occur from slight and transient causes, and need not excite apprehension. But they may also usher in chronic or acute diseases of the brain. Of more marked illusions of the sense of hearing, something has been said at p. 123. The sense of hearing is generally acutely painful in inflammatory affections of the brain; and in common with the sight in the opposite state of the cerebral circulation; also in some cases of hysteria. The opposite state, deafness, is a common occurrence, and often a favourable sign, in febrile diseases, and in the febrile exanthemata. In some instances it is associated with cerebral diseases and forms one of the group of symptoms by which its presence may be recognised.

910. *The sense of smell.*—This sense is subject to illusions similar to those which affect the eye and ear; but the disorders of this sense have little significance as signs of disease.

The sense of taste has been already considered in § 870.

911. (*b*) *Altered muscular action.*—The muscles are subject to paralysis, to convulsion, and to spasm. Paralysis may be local or general, or of greater or less extent. It may affect the muscles of the tongue, or the muscles of the upper eyelid (causing ptosis), or one of the muscles of the eyeball (causing strabismus), or the muscles supplied by the facial nerve (causing palsy of one side of the face), or the muscles of one arm or one leg, or the muscles of one side of the body (hemiplegia), or the muscles of the lower half of the body (paraplegia). The loss of power may also vary in degree, being complete or incomplete. The cause of local paralysis may be either pressure in the

course of the nerve supplying the palsied part, or disease at the origin of the nerve in the brain or spinal cord. As a general rule, paraplegia may be traced to injury or disease of the spinal cord, and hemiplegia to disease of one hemisphere of the brain. A local and limited palsy, traced to a nerve issuing from the base of the skull, becomes an important indication of cerebral disease, if accompanied by palsy of some part supplied by a nerve issuing from another foramen.

912. *Convulsive muscular actions* often afford important indications. Some distinctions worth bearing in mind are referred to at § 486. The convulsive actions most important to observe at the bedside are the twitchings of the muscles in low febrile attacks, known as *subsultus tendinum*, that picking at the bedclothes known as *floccitatio*, and the tremulous protrusion of the tongue. These symptoms only occur in cases which combine great weakness with much excitement of the nervous system; and they may be looked upon as highly unfavourable, though not as fatal symptoms. Convulsions are also of common occurrence in infancy and childhood, and may be brought on by the irritation of teething, constipation, or worms. They are also present, sometimes as an early symptom, in hydrocephalus. In young persons they show themselves in the form of chorea or epilepsy; in adults in epileptic and hysteric seizures, in delirium tremens, in uræmia, and in many kinds of poisoning. They may also occur on one side of the body, while the other is the seat of paralysis. In sudden death from great violence, or from large doses of active poisons, such as prussic acid, general convulsions, attended, as in epileptic fits, by expulsion of urine and fæces, precede death.

913. *Spasmodic actions of the muscles*, or prolonged and rigid contraction, occur in tetanus and in hydrophobia; also in some forms of hysteria. Similar rigid contractions of single muscles, or of groups of muscles, of long continuance, attend organic disease of the brain, and constitute very formidable symptoms. Strabismus is one consequence of rigid contraction of a single muscle.

914. (*c*) *Altered Mental Phenomena.*—These have already been treated of in a former chapter, p. 114; it only remains in this place to speak of that condition known as coma. *Coma* is a state of complete insensibility, and loss of power of thought and motion. It may arise from several causes: from apoplexy; from poisoning by opium, carbonic acid gas, or other substances belonging to the class of narcotics and narcotico-acrids; from drunkenness; from the operation of intense cold; from poisoning of the blood in some disorders of the urinary organs (uræmia); and from accumulation of serum in or on the brain. It is often important to distinguish the coma of drunkenness from that due to apoplexy; and in doing so we are often assisted by the odour of the breath.

915. (6.) THE EXPRESSION OF THE COUNTENANCE, AND THE CONDITION AND ATTITUDE OF THE BODY.—*The expression and aspect of the countenance* often afford great assistance in the diagnosis of disease;

but it is not easy to convey a just idea of the physiognomy of disease by verbal description. The different forms of mental disease are strongly marked on the countenance of the sufferers. The wild excitement of mania, the deep despondency of melancholia, the vacant look of the idiot and imbecile, are familiar to all observers. Patients suffering from delirium tremens have often an air of extreme suspicion, and the habitual epileptic comes to wear an expression peculiar to himself. Again, phthisis, emphysema, organic disease of the heart, diabetes, and Bright's disease, betray themselves to the experienced physician by the expression of the patient's countenance; and hysteria is often detected by rapid transitions from tears to smiles, and by an appearance of health in bad keeping with the complaints of the patient.

916. *The condition of the body* in respect of nutrition, colour, and temperature of surface, and dryness or moistness of skin, is a point which must always engage the attention of the practical physician. Rapid loss of flesh, or sudden corpulency, should equally excite attention. The one is common in such wasting maladies as pulmonary consumption, diabetes mellitus, and organic disease of the stomach, as well as in diseases attended by profuse discharges; also in the decay of aged persons; the other is not uncommon after recoveries from attacks of pulmonary consumption, and it sometimes precedes attacks of apoplexy. Corpulency may also result in healthy persons from the transition from active to indolent habits.

917. *The posture of the body* is often highly characteristic. It betrays loss of power in the paralytic, and weakness in the exhausted. The last stage of typhus fever and of all exhausting maladies is marked by the helpless attitude on the back; and the assumption of a position on the side, such as is common in sleep, often affords one of the earliest and most welcome signs of commencing recovery from fever. The sitting or semi-recumbent posture, with the head raised by pillows, is highly characteristic of diseases directly or indirectly affecting the breathing. It is common in most severe diseases of the lungs, as well as in advanced diseases of the heart. The recumbent posture, with the legs drawn up, is equally characteristic of diseases of the abdominal viscera causing pain on pressure. In diseases of the chest it is important to note on which side the patient lies with most ease and comfort. As a general rule the patient lies on the diseased side of the chest; but the choice of position being determined in one case by a sense of pressure, in another by a sense of dragging, in a third by the facility with which the fluids of the lung gravitate to the air-tubes, and in many cases by more than one of these conditions combined, the inferences to be drawn from posture are less satisfactory than could be wished. In diseases of the abdominal viscera, the patient, as a general rule, lies easiest on the side of the diseased viscus.

CHAPTER V.

GENERAL THERAPEUTICS.

918. THE science of therapeutics treats, as the name implies, of the cure and palliation of diseases. In its widest sense, it comprises all information which has an immediate bearing upon the knowledge of disease, on the one hand, and of the virtues of remedies on the other. The application of this knowledge in individual cases constitutes the *Art* of healing. As there is a general and special pathology, so is there a general and special therapeutics. General pathology has been treated in a former chapter; general therapeutics remains to be considered in the present.

919. This subject is beset by the same difficulties that attach to the study of disease, and by others peculiar to itself. It has been already stated that our knowledge of disease is rendered imperfect by our ignorance of the phenomena of health; just in the same manner our knowledge of the action of remedies in disease is impeded by the slender information which we possess on the effects of those remedies on the healthy frame. But the great obstacle to the improvement of the science and the art of healing is, the difficulty of instituting comparative trials of the efficacy of different modes of treatment in the same disease, and our necessary ignorance of the extent to which the body, if left to itself, would repair the injuries which it sustains. The physician does not feel justified in leaving disease to itself; hence he is ignorant of the nature and power of the "vis medicatrix:" on the other hand, he is unwilling to employ a new remedy in a disease in which an old one has been used by general consent, lest an unsuccessful or fatal result should be laid to his charge.

920. From these considerations it follows that to form an exact classification of remedies, or establish broad principles of treatment, is a work of great difficulty. Nevertheless, the attempt ought to be made, as general principles are the foundation of all sound practice. The difficulties that lie in the way of such an attempt will be best removed by following, step by step, the principal functions of the body, as already described in a former chapter, and endeavouring to show the effect which remedies produce upon each of them in turn. In pursuance of this plan, the following arrangement will be adopted.

(1.) Remedies applicable to disorders of the primæ viæ, including the treatment of disorders of the stomach, liver, and intestines. See Chapter III., Part 1. (§ 140 to 194.)

(2.) Remedies which modify the composition of the blood. See Chapter III. (§ 195 to 234.)

(3.) Remedies which affect the circulation and the functions performed by the several orders of vessels. See Chapter III., Part 2. (§ 275 to 381.)

(4.) Remedies which act upon the structures of the body. See Chapter III., Part 3. (§ 382 to 425.)

(5.) Remedies which act upon the nervous system. See Chapter III., Part 4. (§ 426 to 494.)

(6.) The means of preserving, improving, and restoring health. See Chapter I. (§ 1 to 85.)

(7.) A sixth division will comprise an attempt at a classification of the more important remedies.

1. REMEDIES APPLICABLE TO DISEASES OF THE PRIMÆ VLÆ.

921. *Diet.*—Most disorders of the stomach require some regulation of the diet, or some directions as to the time and mode of taking food. The functional disorder of most frequent occurrence is anorexia, or loss of appetite, attendant upon almost all severe diseases, especially those of an inflammatory or febrile character. This loss of appetite, which is always accompanied by a loss of power to digest food, indicates either entire abstinence, or the use of such articles of diet as are least irritating to the stomach; such as barley-water, toast-water, milk-and-water, and weak tea; acidulated drinks, such as lemonade, and imperial; and the ripe juicy fruits, especially the orange and grape.

922. The functional disorders of the stomach which are independent of the general system, and originate within the organ itself, are of two kinds—acute and chronic dyspepsia. The acute form requires a diet free from all matter which can irritate the tender membrane of the stomach; such as gruel, arrow-root, or sago, made with or without milk, to the entire exclusion of all solid matter, whether animal or vegetable.

923. The chronic form of dyspepsia requires a close attention to the time and mode of taking food, the quantity and quality of the food itself, and the condition of the other functions of the body, especially those of the intestines. Complete mastication of the food, the use of a moderate quantity of liquid, similar moderation in the quantity of solid food, and in the use of condiments, and moderate intervals between meals, are points which should always be insisted on. The particular kind of diet suitable to each patient is, to a certain extent, a matter of experience, and symptoms (such as palpitation with an irregular or intermitting pulse) have sometimes been removed by omitting some single article, such as tea, from the diet-roll.

924. In organic diseases of the stomach, the same abstinence from solid and irritating matters is indicated as in acute dyspepsia; but

such substances must be administered as nourish, at the same time that they are free from irritating qualities; such as strong broths, soups, and jellies. When the stomach is altogether unable to retain food of the least irritating kind, and in the smallest quantities, life may be prolonged by nourishing enemata; and a small quantity of nourishment may be introduced by friction through the skin, or by local baths of warm nutritious liquids.

925. Another point to be attended to in regulating the diet of patients is, to give them food suitable to their age. This caution requires to be especially observed in the diseases of children, in whom the stomach is easily disordered by food ill adapted to their years and strength. Hence solid food of all kinds is apt to disagree with very young children; and the disorder of the stomach and bowels which it occasions gives rise to infantile remittent fever, develops the scrofulous taint, and, if unchecked, terminates in hydrocephalus or mesenteric disease. For children who suffer in any of these ways, a strict regulation of the diet, an abstinence from every kind of solid food, and, in extreme cases, a recurrence to the diet of the infant at the breast, substituting for the milk of the mother new milk from the cow, and administering it, if necessary, in small quantities, and at long intervals, are indicated. This simple treatment, aided by the steady use of aperients when required, is often attended with the best effects, after nourishing and stimulating food has wholly failed.

926. The disorders of the stomach which have been just described affect chiefly, if not entirely, the *reducing* function of the organ. When the *converting* function is disordered, the diet must be regulated according to the nature of the existing disorder. In cases of diabetes mellitus, for instance, where an unusual quantity of sugar is excreted by the kidney, it is usual to prescribe such a diet as is least convertible into saccharine matter. The saccharine staminal principles, therefore, are given in small quantity, and the diet is made to consist chiefly of albuminous and oleaginous elements. The substitution of gluten bread for common bread is also believed to be indicated in this disease. It should be borne in mind, however, that all these restrictions of the diet in diabetes are dictated by a theory, the soundness of which is open to doubt, that when we are unable to attack the cause or source of the disease, it is beneficial to render difficult or impossible the development of its leading symptoms. It is at least possible that a patient suffering from diabetes may thrive as well on a diet which supplies the elements of sugar, as on one that withholds them. To prescribe sugar itself is to push this theory to an unjustifiable limit.

927. A similar, but a less strict, attention to diet, is necessary in the subjects of the oxalic diathesis, in whom it may be sufficient to prevent the use of sugar in its crystallized form.

928. A strict attention to diet is necessary, not merely in disorders

of the stomach, but as a means of inducing certain states of the general system. The influence which a particular diet exercises upon the health is well exemplified in the opposite systems of training practised in preparing men for the exercises of the ring and of the turf. The physician, likewise, resorts to a certain kind of diet, with a view of imparting or reducing strength: allowing a nourishing diet to the convalescent, and restricting the patient labouring under a severe inflammatory or febrile attack to substances containing little or no nutriment. This latter, which is called the *antiphlogistic* diet or regimen, must be more or less strict, according to the severity of the disease in which it is prescribed. In cases of the more severe kind, total abstinence from food may be necessary, liquids being allowed according to the existing degree of thirst: in less severe and urgent cases, the patient may be restricted to a vegetable diet, which has little effect on the circulation.

929. During convalescence from acute diseases, it is necessary to pass with caution from the abstinence of the strict antiphlogistic regimen to vegetable diet, from that to fish or light broths, and then to meat in moderate quantity, beginning with that most easy of digestion, namely, mutton. The regulation of the diet during convalescence is of much importance, and requires a strict attention, on the one hand, to the powers of the stomach, as tested by the appetite, and the effect of the food already prescribed; and, on the other, to the state of the circulation, as evidenced by the pulse.

930. The physician should bear in mind that vegetable food has little or no effect on the circulation, but that animal food stimulates, that warm liquids excite, whilst cold liquids act as sedatives, and that food produces its greatest effect on the circulation in the early part of the day. The knowledge of these facts should be acted on, especially in cases of slow and unsteady convalescence; that is to say, in those cases where debility is accompanied by some remains of local affection, where the appetite is variable, and that condition of the general system exists known as "irritation." On the other hand, when the patient is free from disease, and nothing but debility remains, when the appetite is good, and the circulation tranquil, food may be administered with less caution.

931. But there are cases in which a nourishing and even stimulating diet is necessary, though local inflammation and constitutional irritation be present. These are cases in which debilitating discharges exist, or extensive injuries are in course of reparation, requiring a more abundant supply of nourishment than that which the stomach, if left to itself and guided by the existing appetite for food, would be able to supply. Here we must combine the stronger and more stimulating kinds of solid food with liquids containing nourishment and stimulus, as wine, ale, porter, &c. In such cases, too, the previous habits of the patient must be attended to, and the drunkard must be supplied with his *accustomed* stimulus.

932. It may be well in this place to insist upon the general rule that where diet is equally efficacious with medicine, it should always have the preference: for the duty of the physician is not to cure disease by physic, but to cure it by all the means which are within his reach; and the more simple the means, the stronger their claim upon his notice.

933. Diet forms but a part of the remedial means which we have at command in treating diseases of the stomach. For acute affections of the mucous membrane of the stomach, indeed, diet alone will often prove a sufficient remedy, though it may occasionally be necessary to resort to leeches or blisters to the epigastrium; but for those affections known as chronic dyspepsia, medicines are required in addition to the regulation of the diet.

934. Many substances, which have the effect of increasing the appetite and the powers of the stomach, are in common use as *condiments*. Of these, common salt is the only one absolutely required; for experiment has shown that animals deprived of this simple condiment soon perish, however nourishing their food may be in other respects; and one of the severest punishments to which man has ever been subjected, is a diet from which common salt is excluded. When, however, the diet consists principally of vegetable food, the use of spices is to be commended, as promoting digestion.

935. Almost every substance possessed of active properties produces some effect upon the mucous membrane of the stomach, and by far the majority increase its vascularity, the flow of its secretion, and the contraction of its muscular coat. All the rubefacients, for instance—that is to say, all those substances which inflame the skin, inflame the mucous membrane of the stomach also; and many substances which have not power enough to act upon the skin through the cuticle, affect the more delicate and less protected mucous membrane of the stomach. In small doses, these substances increase the appetite and strengthen the digestion; when long continued, they produce congestion and debility of the capillaries; and when given in large doses, they act as emetics. Thus common salt, which in moderation is the best and safest condiment we possess, when given in large doses, produces sickness, and in still larger ones, acts as an irritant poison. The same observation applies to mustard, horseradish, and garlic.

936. There is reason to believe that almost all substances, whether derived from the vegetable or mineral kingdom, act upon the stomach nearly in the same way. For instance, a quarter of a grain of arsenic or a grain of tartar-emetic, or a scruple of sulphate of zinc, or the same dose of ipecacuanha, will not produce vomiting more effectually than a table-spoonful of mustard, or twice the quantity of common salt, or a large draught of warm water. On the other hand, a thirtieth of a grain of arsenic, or the twelfth of a grain of tartar-emetic, or one or two grains of zinc, or the same dose of ipecacuanha or squill, will as surely increase the appetite as half a tea-spoonful of salt or mustard,

or a small draught of warm water. In choosing, then, between the substances which act as emetics in large doses, and as gentle stimulants in small ones, we prefer those which produce the least injurious effect upon the constitution; and these are the substances which experience has pointed out as the best and safest condiments. A list of them would comprise all the stimulant and aromatic herbs used in cookery as well as many substances employed in medicine. Under different names and variously combined, they have all been given either as independent remedies in dyspepsia, or to qualify remedies directed to other organs. Thus we combine mint, or ginger, or cloves, with saline purgatives, ammoniacum with squills, galbanum with aloes, the essential oils with many different kinds of aperient pills.

937. The simple, the warm aromatic, or the astringent, bitters, under the name of aromatics, stomachics, carminatives, or cordials, are the remedies most frequently employed with a view of increasing the appetite, or causing the muscular fibres of the stomach to contract.

938. *Emetics.*—Any of the remedies just enumerated, when given in large doses, are emetics. Those in most common use are ipecacuanha, tartar-emetic, and zinc; and mustard or common salt are often used on an emergency, when other emetics are not at hand. It is usual to promote the action of these substances by copious draughts of warm water, and by tickling the throat with a feather. Emetics are commonly prescribed, merely with a view of emptying the stomach; occasionally they are used for this purpose in the beginning of febrile affections, and they are administered frequently, and at short intervals, with good effect, in incipient cases of phthisis pulmonalis, and in bronchitis accompanied with profuse expectoration. They have also proved themselves an efficient means of producing reaction in the collapse of Asiatic cholera. Common salt, in the dose of three table-spoonfuls to a quart of water, has been administered in that condition with the best result.

939. The stomach becomes less sensible to the effect of stimulants if often repeated: so that what was an emetic at first becomes a promoter of digestion; while a more gentle stimulant loses its effect entirely by repetition. Thus, a cigar, to a person unaccustomed to smoke, will cause vomiting; but, after many repetitions, it becomes an effectual promoter of digestion. The same thing occurs in disease during the administration of tartar-emetic: the first few doses will often cause sickness; but ere long the stomach becomes accustomed to its use, and, if continued, it produces that amount of stimulation which is favourable to digestion.

940. The remedies which have been mentioned, though differing but little in their direct action on the stomach, vary greatly in their remote action on other organs of the body. Some of them belong to the class of stimulants, others to that of tonics, and the most active are strong irritant poisons.

941. All the medicines just enumerated produce, according to

their dose, a determination of blood to the mucous membrane; and there are probably few which produce contraction of the capillaries. Cold liquids and ice are the most effectual remedies of this sort, and are therefore well adapted to combat severe inflammation of the stomach, or active hæmorrhage from the mucous surface. In the more chronic forms of determination of blood, and in passive hæmorrhage, nitrate of potash in full doses may be administered with advantage.

942. The muscular coat of the stomach may be stimulated to contraction most effectually by the warm aromatic bitters, as ginger, mint, cardamoms, &c.; the neuralgic pain of the stomach (gastrodynia), is often effectually removed by bismuth, zinc, or nitrate of silver, and troublesome sickness by creosote. This symptom is, however, often effectually relieved by dilute hydrocyanic acid—a remedy belonging to a different class.

943. *The Liver.*—The functional disorders of the *liver*, which consist in a diminished secretion of bile, are most effectually treated by small doses of mercury, or by the nitro-muriatic acid. This latter remedy is sometimes applied externally, as a foot-bath. Another remedy sometimes given, with the same object of promoting the secretion of the bile, is taraxacum.

Intestinal Canal.—The chief functional disorders of the intestinal canal are diarrhœa, hæmorrhage, and constipation.

944. *Diarrhœa*, like dyspepsia, may be acute or chronic. Acute and recent diarrhœa, like acute gastritis, may always be removed by a farinaceous diet, from which all solid and irritating matters are excluded. Chronic diarrhœa, arising as it does from a congested state of the mucous membrane, may be cured most effectually by removing that congestion. This is effected by small doses of mercurial preparations, which, acting on the liver, increase the secretion of the bile, and unload the branches of the vena portæ. Where this treatment fails, which it rarely does, and probably only where the mucous membrane is in an extremely relaxed state, astringents may be resorted to, as chalk mixture, aromatic confection, catechu, kino, tannin, &c. When these fail, stronger astringent minerals, as sulphate of copper, in combination with opium, may prove successful, and nitrate of potash sometimes succeeds where these have failed.

945. Dysenteric diarrhœa which is characterised not by profuse mucous discharges, but by scanty and teasing evacuations of a gelatinous substance, or of mucus mixed with blood, is best treated by full doses of castor-oil in combination with laudanum. Small doses of some mild mercurial preparation, given two or three times a-day, so as to act on the liver, and free the circulation through the portal vessels, may be necessary in chronic cases. The dysentery of warm climates, and of armies, is a disease which varies greatly in different cases, and in different epidemics, sometimes being highly inflammatory, and requiring antiphlogistic treatment, sometimes combined with scorbutic symptoms,

and with a degree of debility contra-indicating all active antiphlogistic measures.

946. *Hæmorrhage* from the intestines (melæna) requires the same treatment as chronic diarrhœa—viz., small doses of mercurial preparations, to increase the secretion of the liver, and unload the vena portæ, combined with an unirritating diet. This treatment will be equally effectual, whether the blood come, as some suppose, from the liver itself, or from the surface of the intestines.

947. Another form of hæmorrhage from the bowels occurs in dysentery; blood is also passed from internal or external piles; and occasionally florid blood is discharged in large quantity from the open mouth of a single artery. Ipecacuanha and opium have been found eminently serviceable in dysentery. Piles are most effectually relieved by unloading the bowels, by promoting the secretion of the liver, by the local abstraction of blood, and the local application of warm or cold water, according to the experience of the patient. The last-named form of hæmorrhage is detected by the use of the speculum ani, and cured by the application of nitric acid to the bleeding vessel.

948. *Constipation*, as it arises from many causes, requires many remedies. The substances which naturally promote the action of the bowels are those which escape the action of the stomach, and are not convertible into nourishment; such as the green matter of vegetables, the hard covering of seeds, the tendons and gristle of meat. Where these are carefully removed in the process of cookery, constipation is apt to arise, and may often be removed by introducing some of these indigestible substances into the food. Thus, brown bread will often prove an effectual laxative. Constipation is also apt to occur in persons of sedentary habits, and to disappear under active exercise.

949. The medicines which act upon the bowels are all those that cause vomiting when taken into the stomach, as tartar-emetic, tobacco, sulphate of zinc, ipecacuanha, squills, &c., and the whole class of irritant poisons. It is probable that all purgatives given in sufficiently large doses would act as emetics, just as all emetics given in too small doses to produce vomiting, when they pass into the bowels, act more or less energetically as purgatives. Many of those substances, however, which act as violent purgatives, have little or no effect on the stomach; hence their action may be considered as in some degree peculiar.

950. Purgatives act in two ways—by promoting the secretion of the mucous membrane, and by increasing the peristaltic action of the intestines; but some act slightly in one of these ways and energetically in the other. Those which excite abundant watery discharges are called *drastic* or *hydragogue cathartics*.

951. Purgatives are of various kinds, and may be divided into

groups or classes; as the mild cathartics or *laxatives* (manna, cassia pulp, tamarinds, prunes, honey, bitartrate of potash, and the fixed oils, as castor, almond, and olive oils); the *saline* or antiphlogistic purgatives (sulphates of soda, potash, and magnesia); the milder acrid purgatives (senna, rhubarb, and aloes); the strong acrid purgatives (as jalap, scammony, black hellebore, gamboge, croton oil, colocynth, and elaterium); and, lastly, the mercurial purgatives (as the hydrargyrum c. cretâ, the pilula hydrargyri, and calomel).

952. We make choice of one or other of these remedies, according to the object which we have in view. If we wish simply to relieve the bowels, we prefer the compound rhubarb, or compound colocynth pills, or combinations of aloes with rhubarb or ipecacuanha; if gently to promote the secretion of the whole course of the intestinal canal, we use the gentle laxative; if to reduce inflammation, the saline; if to overcome obstinate constipation, the stronger purgatives; if to remove dropsical effusions, the drastic or hydragogue cathartics; and if we desire to promote the secretion of the liver at the same time, we combine the mercurial purgatives with those adapted to fulfil other indications.

953. The choice of purgatives is not more important, however, than the mode of administration. When the bowels have been long overloaded with fæces, and especially where the irritation produced by them has affected the nervous centres, it is important to remove the load from the intestines without increasing the mischief already existing; in other words, hypercatharsis must be carefully avoided. Here we must not only select such purgatives as effectually remove the feculent matter, but watch their operation from day to day; and as soon as any signs of intestinal irritation make their appearance, we must withdraw our purgative, and treat the hypercatharsis as if it were diarrhœa produced by any other irritating cause—viz., by a mucilaginous diet.

954. In cases of extreme irritability of the stomach or bowels, or of both, we may relieve the intestines by enemata, consisting of warm water, or gruel with or without an admixture of common salt; or we may employ any of those remedies which act as purgatives, however introduced into the system. Of these, the most effectual is croton oil combined with castor oil, and rubbed into the skin. The shock of cold water on the surface of the abdomen, or the electric spark, will also produce a purgative effect; the former is sometimes employed with advantage in cases of obstinate constipation.

2. REMEDIES WHICH MODIFY THE COMPOSITION OF THE BLOOD.

955. Every article of food, and all poisons and medicines (even those which are least soluble) find their way into the blood. Those substances which enter naturally into its composition, when taken in

quantities proportioned to the wants of the frame, are used in building up the fabric of the body; but when taken in excess, they are changed in composition, and eliminated by one or other of the excreting organs. Poisons and medicines, in like manner, mixing with the blood, are circulated with it, and are discharged in the excretions. But as this discharge of matters extraneous to the proper composition of the blood takes place gradually, and often very slowly, those matters are brought into contact with the textures of the body; and when the dose is large, or often repeated, continue to be circulated through them for considerable periods of time.

956. In the treatment of disordered states of system and of diseases properly so called, we sometimes aim at a cure by administering articles of diet or medicines which have the effect of supplying some defective element of the blood, and sometimes purposely introduce a substance foreign to its composition, which experience has shown to possess the power of destroying or counteracting some injurious or poisonous material to which the diseased condition owed its origin. The substances of the first order are very properly termed *Restoratives;* those of the second order have received the less unexceptionable designation of *Catalytics.*

957. *Restoratives.*—The class of restoratives may be distributed into two sub-classes.

(1.) One sub-class comprises water and every species of wholesome food, when the body is from any cause reduced to a state of disease or disorder from the want of them. Thus water has the virtue of a medicine after long marches, in starved and wounded persons, in some forms of poisoning, in profuse discharges of blood, and in diseases accompanied by excessive secretion of fluid; and there are cases in which a limited use of water may act beneficially. A nutritious animal and vegetable diet is as medicine to the convalescent, a spare diet consisting chiefly of vegetables to the plethoric and gouty patient. Fresh vegetables and ripe fruits are a *panacea* in scurvy, fatty and oily substances of some service in phthisis, animal and vegetable matters not containing sugar are to be preferred in diabetes mellitus, sugar in a crystallized form is forbidden in the oxalic acid diathesis, and fatty matters are contra-indicated in disease of the pancreas.

(2.) Another sub-class consists of those medicines properly so called, which supply an element wanting to the blood. Such a medicine is iron and its preparations in anæmia and in allied states of system; such are alkalies and acids respectively when from the acid or alkaline condition of the urine it is inferred that there is an excess of acid or of alkali in the blood. The whole class of vegetable tonic medicines, of which quinine is the most important, is believed by some authorities (see Headland on the Action of Medicines) to act favourably in states of debility by supplying to the blood an element closely allied in composition to the *taurine* of the bile.

958. Catalytics.—The medicines of this class are believed to

possess the property of destroying or neutralising certain morbid poisons existing in the blood. Thus mercury destroys or neutralises the venereal poison, especially when it is recently introduced into the system, and iodide of potassium works the same effect when the same poison displays itself in secondary symptoms, and particularly when the periosteum is the part affected. Again, mercury, in an eminent degree, and the fixed alkalis in a less marked manner, possess the power of checking inflammation, which power is attributed, at least in part, to their well-known property of rendering the fibrin of the blood more soluble. The nature of the change which arsenic produces in the blood is less obvious, though its efficacy is undoubted; and the same observation applies to iodine and antimony.

959. The more active medicines which are known to exert a power over inflammation also excite inflammation when locally applied; and it admits of question whether this power is due to some change brought about in the blood of the part, or to a change in the state of the capillary vessels produced by the action of the medicine dissolved or suspended in the blood. The same difficulty presents itself when we try to explain the effect of the same medicines taken by the mouth and thus introduced into the general circulation. In the next section this class of medicines will be treated as acting on the capillary vessels. In this place it must suffice to observe, that the class of catalytic medicines has been distributed into no less than eight sub-classes, according as they have the power of counteracting inflammation, neutralising or destroying the poison of syphilis, promoting the absorption and dissipation of scrofulous deposits, correcting the state of the fluids in gout and acute rheumatism, curing scurvy, curing ague and other intermittent disorders, curing convulsive maladies, and proving more or less beneficial in diseases of the skin.—(See Headland on the Action of Medicines.)

3. MEDICINES WHICH ACT ON THE ORGANS OF CIRCULATION.

960. We recognise four distinct states of circulation in healthy persons, in disease, and under the operation of medicines, of which states of circulation the character of the pulse affords the best indication. 1. Increased frequency of pulse with increased force and fulness; 2. Increased frequency of pulse with diminished force and fulness; 3. Diminished frequency of pulse with increased force and fulness; 4. Diminished frequency of pulse with diminished force and fulness.

961. In health, the first state of circulation is brought about by violent exercise, by spirituous liquors, and by other stimulants; the second may be produced by those strong mental emotions and impressions which, in excess, give rise to syncope; the third attends exhaustion and sleep; and the fourth is very commonly observed in the less healthy inhabitants of large towns, and in those who lead sedentary lives.

962. In disease, the first state of circulation is present in acute inflammation or high inflammatory fever; the second, in all diseases attended with extreme debility; the third, in some cases of hysteria in females, and in some cases and certain stages of apoplexy; and the fourth, in persons predisposed to, but not actually suffering from, pulmonary consumption, as well as in some exceptional cases of fever and the febrile exanthemata.

963. The same conditions follow the operation of remedies; the frequent, full, and strong pulse is produced by spirituous liquors, by ammonia, and by other diffusible stimulants; the frequent, small, and weak pulse by tartar-emetic, tobacco, lobelia inflata, and aconite; and the infrequent pulse, of varying size and force, by opium, digitalis, conium, stramonium, and other remedies belonging to the same class. The infrequent and weak pulse is a common effect of digitalis.

964. In the cases specified—that is to say, in health, in disease, and under the operation of remedies, supposing the several states to be produced in the same person, with the same quantity of circulating fluid in his body, it is obvious that in a given time more blood will traverse each organ in the first case; a less quantity in the second case; a variable quantity, sometimes more, sometimes less, in the third case; and a smaller quantity in the fourth case.

965. In the first case, the quantity of blood traversing each organ is increased in two ways; by the increased frequency of the heart's beat, and the increased quantity of blood sent out at each contraction of the ventricle; in the second case, the quantity of blood passing through each organ is diminished, because the quantity of blood sent out from the heart is lessened more than the number of beats is increased; and in the third and fourth cases, the heart sends out in one case more, in another less, blood than will compensate for the diminished number of its beats.

966. The remedies which augment the frequency as well as the force of the heart's contractions are called *stimulants;* those which augment their frequency and diminish their force are called *depressants;* those which produce diminished frequency with increased or diminished force are termed *narcotics* and *sedatives*.

967. *Stimulants* (*incitants* or *excitants*).—The state of the circulation, as indicated by the pulse, being made the test and measure of the effect of remedies, those remedies are stimulants which increase the frequency, as well as the force, of the heart's contractions. There are exceptional cases, however, in which stimulants lessen, in lieu of increasing, the number of the heart's contractions.

968. This excited state of circulation is brought about by the agency of the nervous system, whatever the part to which the stimulant is applied; and the change thus produced in the condition of the nervous centres is reflected back upon the heart and organs of

circulation. If, for instance, a stimulant, such as brandy, be taken into the stomach, the impression produced upon its nerves is conveyed either directly to the heart through the branches of the solar plexus, or to the brain and spinal cord, whence it is reflected upon the heart; or being absorbed into the circulation, it may be applied directly to the nervous centres, or to the nerves supplying the lining membrane of the heart itself. Here there are many possible ways in which the circulation may be affected; but a more simple case is that of exercise, the most powerful stimulant of the healthy frame. The effect of exercise on the circulation is in part mechanical, but it also arises, in part, from the reflection of nervous influence upon the heart in common with the voluntary muscles of the body. Again, the effect of heat applied to the skin, though partly due to the determination of blood to the surface, is in some degree dependent upon the excited state of the nervous system.

969. The local effects of stimulants on the healthy body are due to the increased quantity of blood sent to every organ of the frame. The rapid and abundant circulation through the lungs leads to a more frequent respiration, and a more complete decarbonization of the blood: the increased flow of arterial blood to the brain excites all its functions; the impressions on the senses are more acute, the flow of ideas more rapid, volition stronger and more prompt, the passions excited, the feelings joyous: all the capillaries of the body are distended; and the glandular structures pour forth their secretions: the involuntary muscles, too, partake of the general excitement; and the functions dependent upon them, such as digestion and defæcation, are performed with increased vigour.

970. Such are the effects of stimuli given in moderate quantity: in excess they act as depressants or narcotics. Thus spirituous liquors, in moderate doses, produce all the effects which have been described; but large doses give rise either to collapse or to narcotism; in other words, they occasion vomiting, extreme debility, a cold sweat, a frequent and small pulse; or symptoms of apoplexy, with oppression of all the functions, paralysis of the voluntary muscles, an infrequent beat of the heart, or a quick, full, bounding pulse. The first effect is commonly produced in persons unused to the action of the stimulant; the second, in those accustomed to it. Similar effects are produced by chloroform and the ethers; but with them, narcotism is the rule and collapse the exception. The action of ammonia is more purely stimulant than that of either alcohol or ether.

971. It may be laid down, then, as a general rule, that stimuli carried to excess produce exhaustion of the nervous power, and that this exhaustion may display itself in one of two ways—in depression or oppression; in debility or coma.

972. It has been stated (§ 962) that increased frequency, fulness, and force of pulse is the test of the action of stimulants, but that there is one case in which the test does not apply. It is the case of

debility, without local disease, characterised by a small and frequent pulse, which loses frequency and gains force under the use of stimulants. It has also been stated elsewhere (§ 472), that the effect of stimulants on a pulse rendered infrequent by debility without local disease, is much less than that produced on the pulse of healthy persons, a fact easily explained by the exhaustion of the nervous system which attends debility, and renders it dead to all impressions from within or from without. If stimulants administered in this state of debility lower the pulse, they act favourably; if they raise it much, they do harm. In the one case, they act as tonics; in the other, they merely impart momentary strength, to be followed by depression proportioned to the previous excitement.

973. As the question whether we shall or shall not administer stimulants in certain diseased conditions is one of extreme importance, it may be well to enter a little more minutely both into the signs which indicate the expediency or necessity of resorting to them, and into those which serve to prove that we were justified in administering them. The conditions of system which especially demand the exhibition of stimulants, are, 1. The fainting state. 2. The permanent state of exhaustion brought on by loss of blood, the long continuance of profuse discharges, prolonged abstinence from food, the use of an innutritious diet, and mental or bodily fatigue. 3. The state of exhaustion which supervenes in the course of febrile disorders, which assume the typhoid or adynamic type: and 4. The state of exhaustion that ushers in many severe diseases.

(1.) The fainting state, in whatever way it may be brought about, whether by sudden loss of blood, by violent or prolonged exertion, by exposure to a heated and impure atmosphere, by intense mental emotion, by the temporary cessation of the heart's action in organic diseases of that organ, or by the operation of large doses of certain poisons, as prussic acid, and the vapour of ether and chloroform, demands the same treatment; namely, the shock of cold water proportioned to the urgency of the case, and the diffusible stimulants, ammonia, ether, and alcohol in the form of the stronger spirits.

(2.) The permanent state of exhaustion brought on by loss of blood, by the long continuance of profuse discharges, or by any of the several causes just specified—a state indicated by extreme pallor of the countenance and skin; small, quick, and frequent, or small, frequent, and irregular pulse; hurried respiration, with frequent sighing; great nervous irritability; and, in some cases, delirium—demands the continued and persevering use of those less diffusible stimulants which combine alcohol in variable proportion with a certain quantity of nourishment, such as porter, ale, wine, and brandy. The quantity, strength, and repetition of the stimulant will have to be carefully proportioned to the degree of exhaustion. It will generally be expedient to combine a narcotic with the stimulant, in which case *laudanum is* obviously indicated.

(3.) That state of exhaustion which supervenes in the course of febrile disorders assuming the typhoid or adynamic type (to which class belong typhus fever itself, many cases of the febrile exanthemata, measles, scarlatina, small-pox, and erysipelas, the remittent fever of children, puerperal fever, pneumonia, and the irritative fever following severe surgical injuries), also requires the use of stimulants. The extreme degree of this state of exhaustion is so well marked by the position on the back, the sinking of the body towards the foot of the bed, the picking of the bed-clothes, the low muttering delirium, and the involuntary discharges, that there can be no difficulty in deciding that stimulants are necessary. But long anterior to this stage of extreme exhaustion and collapse stimulants may often be given with the greatest advantage. Nevertheless the symptoms may at that earlier period be such as to excite a doubt of the propriety of administering these remedies: the skin may be hot and dry, the tongue covered with a dark dry fur, the breathing quickened, the pulse frequent and sharp with some degree of fulness, the countenance dusky, the vessels of the eye injected with dark blood, the patient restless and delirious, his movements indicating a certain amount of muscular strength. In this state of things it may become a grave practical question whether stimulants ought or ought not to be given, and our doubts can only be decided by actual experiment, and careful observation of the patient before and after the use of the stimulant. The best mode of procedure is first to examine and count the pulse prior to the use of the stimulant: then having caused the patient to swallow a glass of wine, to examine and count the pulse afresh. If it should become more frequent, and increase in hardness and sharpness, the stimulus is unsuitable. If, on the other hand, the pulse falls and becomes decidedly slower and softer, we were justified in the use of the stimulant, and may safely prescribe its cautious repetition. If after an interval of a few hours, during which we have persevered in the use of stimulants, we find the pulse less frequent, slower, and softer, the tongue becoming moist, the skin cooler, and moistened with perspiration, the breathing deeper and slower, the countenance less dusky, the eye more clear, and the restlessness and delirium abated, we have every reason to persevere in the course of treament on which we have entered. A sign much insisted on by Dr. Stokes, as decisive of the necessity for stimulants, is the condition of the heart. As this organ partakes of the weakness which affects the entire muscular system, its pulsations become extremely feeble, and the first sound almost imperceptible. The beneficial operation of stimulants is therefore indicated by increased force of impulse, and renewed distinctness of sound. As the one condition of the heart indicates the necessity for stimuli, so does the other justify the use of them. Where, then, the pulse itself does not furnish satisfactory indications, the ear or the stethoscope applied to the region of the heart may assist us in our decision.

(4.) That state of exhaustion which commonly supervenes in the advanced stages of typhus fever, and in other diseases which have put

on the typhoid type, is sometimes present in the early stages of the same maladies. The effect on the system of the poison of the several infectious and contagious disorders is sometimes nearly allied to a state of collapse. The patient is extremely weak, and subject to faint on the slightest exertion, the countenance is pale, the surface cold, the pulse frequent, full, quick, and extremely compressible, and the respiration hurried. In this state also it may be a question whether stimulants ought to be employed, and, as in the former instance, actual experiment alone can decide the question. If the effect of the stimulant be to lower the pulse and render the breathing less frequent, we are justified in prescribing its repetition, taking care, at the same time, to be on the watch for the reaction which in many cases follows this state of depression.

974. *Tonics.*—These remedies, as the name implies, are given in states of debility, and specially in convalescence from exhausting maladies, with a view of restoring firmness, strength, and *tone* to the entire frame. When the body is extremely weak, stimulants have the effect of imparting real strength; in other words, they become tonics. In less degrees of debility, they produce less obvious effect than on the robust and healthy. Again, stimulants in large doses become tonics in small ones. But the class of remedies to which the term *tonics* is commonly and properly applied, have the property of gradually restoring the strength without stimulating the system. One class of tonics owes its virtues to its power of supplying a deficient element of the blood, namely, the preparations of iron. The good effects produced by the remainder of the class (such as bark, and its active principle quina), are not so readily explained.

975. *Depressants.*—This name is here used to distinguish a class of remedies which has the effect of rendering the pulse frequent, small, and weak—the exact reverse, therefore, of the action of stimulants. This change in the circulation is accompanied by great prostration of strength, nausea, cold sweat, and all those symptoms which characterise approaching syncope. It is brought about by the abstraction of blood, by the preparations of antimony, by tobacco, aconite, and the lobelia inflata, and by the less active remedies, ipecacuanha and squills.

976. The loss of a large quantity of blood, or the rapid removal of a smaller quantity, brings about syncope, or a state approaching to it; and as during this state the heart sends out a comparatively small quantity of blood, and that which it does send forth is propelled with little force, that part of inflammation which consists of an increased action of the heart is removed by the abstraction of blood.

977. Tartar-emetic, which, next to bleeding, is our sheet-anchor in acute inflammation, and one of the most powerful and safe remedies in the materia medica, brings about the same condition as that produced by bleeding, and may be employed either alone or in combination with blood-letting in the treatment of all *acute* inflammations. Tartar-emetic is the only depressant of acknowledged power and efficacy which

acts simply as a depressant; for tobacco, which produces a very similar effect, in some respects, combines the properties of a narcotic and a depressant, and the same observation applies to another powerful depressing agent, the lobelia inflata.

978. As there is an exception to the rule that stimulants increase the frequency and force of the pulse, so is there an exception to the rule that depressants increase its frequency while they diminish its force. Thus, blood-letting, which belongs to the order of depressants, will render the pulse full and strong, and even increase its frequency, in certain cases of plethora, when the circulation is oppressed with blood, and in pneumonia, when the powers of the system are oppressed and the circulation impeded by obstruction to the important function of respiration. Again, in cases of acute inflammation accompanied with high inflammatory fever, bleeding or tartar-emetic will lessen the frequency and force of the pulse at the same time. In all these cases, however, the modus operandi of these remedies is essentially the same; it appears to be different merely because the circumstances in which the remedies are employed vary.

979. *Sedatives.*—These remedies differ from stimulants and depressants, inasmuch as they do not increase the frequency of the pulse, but, on the contrary, diminish it. The true sedatives sometimes produce sleep, but they as frequently occasion wakefulness; they differ from the pure narcotics inasmuch as in large doses they cause delirium, or a state nearly resembling delirium tremens, while the narcotics in large doses occasion coma and apoplexy.

980. Hydrocyanic acid, digitalis, and aconite are the principal remedies of this class, to which may be added the powerful remedy of cold. Hydrocyanic acid, digitalis, and aconite lower the pulse, although they bear no resemblance, in other respects, to narcotics. It is true that there are states of system in which these remedies will increase the frequency of the pulse, just as there are states of system in which the effect of stimulants and depressants on the circulation is reversed. Digitalis, for example, which, administered in diseases accompanied with a frequent pulse, lowers it in a remarkable degree, and often reduces it much below the healthy standard, in some healthy persons, and perhaps in all, has the reverse effect.* The effects of hydrocyanic acid are more constant; but there is little doubt that exceptions exist to the rule of its operation.

981. *Cold,* according to the degree and manner of its application, acts in very different ways. Its general effects on the circulation depend upon its intensity. A moderate degree of cold applied to the general surface acts as a stimulant; but when the skin is hot and dry it reduces the temperature, lowers the circulation, soothes the nervous system, and disposes to sleep. Applied to the head, in the form of cold lotion or of ice, it is one of the most valuable remedies in inflammatory

* See the experiments made by Dr. Saunders on his own person, and detailed in his work on Consumption.

affections of the brain. Its application to other parts of the body is of the greatest service in local inflammation or hæmorrhage. Cold is applied to the throat internally or externally in scarlatina anginosa, and ice may be swallowed in hydrophobia with great relief to the symptoms. Applied locally, in the form of *douche*, it restores the contractility of the capillary vessels, and by preventing further effusion, allows the absorbent vessels to remove any fluid which may have been thrown out. Cold is also a valuable anæsthetic, and is so employed in painful operations on superficial parts. Again, intense cold acts as a narcotic, and produces states of system difficult to distinguish from the effects of alcohol. These anæsthetic and narcotic effects of cold will be considered presently.

982. *Narcotics.*—The action of these remedies belongs so completely to the fourth head (the action of remedies on the nervous system) that nothing need be said in this place except that the effect of narcotics on the circulating system is the opposite of that produced by stimulants and depressants—viz., that of diminishing the frequency of the heart's contractions. These remedies also affect the respirations in a striking manner, diminishing their number in a still greater degree than that of the pulse. This combined decrease of the pulse and respiration may serve to distinguish the action of this class of remedies; for all those remedies which produce great debility, as the depressants, for instance, increase the number of the respirations, though in certain cases they diminish that of the pulse. The double effect of narcotics on the pulse and respiration, therefore, deserves attention.

983. The remedies which have been examined affect the circulation primarily by the influence which they exert upon the nervous centres; and secondarily, through the reflection of that influence upon the heart. It remains to speak of the means which we have of effecting changes in the smaller arteries and capillary vessels.

984. *Remedies which affect the small vessels:* Treatment of inflammation.—It has been already stated that in inflammation there is diminished action (that is, diminished contractility) of the small arteries, with increased action of the heart, and that the two, together, keep up that dilated condition of the small vessels which is the essence of inflammation. It is obvious that there are two ways in which these minute vessels may be restored to their healthy degree of contraction; the first is by lessening the quantity of blood which passes through them; and the second, by increasing their contractility. In most acute inflammations, both these remedies are required. If the inflammation be recent, the small vessels may recover themselves if once relieved from the undue quantity of blood sent to them by the heart; and in this case the abstraction of blood, or the use of depressing remedies, will suffice; but if the inflammation be chronic, the small vessels may have so lost their contractility, as not to recover *themselves*, though the blood circulates through them in diminished

quantity; and in this case we must make use of such remedies as restore the lost contractility of the vessels; and precisely the same treatment is required in that state to which we give the name of congestion.

985. The treatment of inflammation then is twofold—it consists in diminishing the quantity of blood sent out by the heart on the one hand, and in restoring the lost contractility of the small vessels on the other. The first indication can be fulfilled only by general remedies, the second by general or by local means.

986. As the increased action of the heart occurs only in the *acute* form of inflammation, it is in that form alone that general remedies are necessary. These remedies are general blood-letting, aided, in certain cases, by active purgatives; and depressants, of which the best is tartar-emetic. Take, for example, an acute case of pleurisy, occurring in a robust man, or in one previously enjoying good health, the treatment is very simple—bleeding to the approach of fainting, or the complete cessation of pain, followed, without loss of time, by tartar-emetic, in such doses and at such intervals as to keep up a constant state of nausea. Bleeding alone, even though often repeated, will not suffice to subdue the inflammation, for each bleeding is followed by reaction, and that reaction re-establishes the inflammation. By combining depletion with depressing remedies we save blood, and avert chronic disease. If tartar-emetic should fail to subdue the inflammation after one bleeding, which it may possibly do in very plethoric persons, another bleeding must be resorted to, for it is always better to risk temporary debility than chronic disease.

987. The great principle to be observed in the treatment of acute inflammation, is to subdue it at once, so as not to allow reaction; and to give the small vessels time to contract to their usual size.

988. In thus advocating a prompt and decisive line of treatment in acute inflammation occurring in healthy persons, it is necessary to guard against the extension of this principle to cases of so-called acute inflammation occurring in the unhealthy inhabitants of large towns, in whom it may be necessary not merely to abstain from depletion, and the use of depressing remedies, but, in spite of the existence of inflammation, to adopt even an opposite mode of treatment.

There is also one disease of common occurrence, and of very fatal tendency, to which, for obvious reasons, the active treatment of inflammation is in most cases inapplicable. That disease is pneumonia, which is, in part, an inflammation affecting the vessels supplying the texture of the lung, and in part a congestion of the vessels conveying the blood to and from the lung for other purposes. Though active measures would tend to reduce inflammation in the tissues of the lung, they would, at the same time, by reducing the force of the heart's beat, tend rather to increase than to diminish the congestion of the pulmonary vessels. It is in this disease, therefore, that a purely expectant treatment, or, in the case of the inhabitants of large cities, a

slightly stimulant treatment, has been shown to produce the best results.

989. Such is the treatment of acute inflammation where it is accompanied by strong action of the heart. But this is not present in all cases of inflammation. It is absent in inflammation of the mucous membranes, unless they take on the most acute character, as in croup, or in cases of irritant poisoning; it is absent also in erysipelas, and in many cases of inflammation occurring in persons of broken constitution. The chief inflammatory diseases which affect the general circulation are those of the serous membranes, acute rheumatism, and extensive inflammation of the cellular membrane following injury.

990. When inflammation of the mucous membranes occurs in its most severe form, general depletion is necessary, especially if the affected membrane line some narrow passage, which is apt to be filled with the secretion poured out from its surface. Thus we bleed in croup, partly on account of the existing inflammation, and partly because the narrow passages of the larynx and trachea are apt to be filled up by the tenacious secretion poured out from the surface of the membrane.

991. There is another case in which we are obliged to employ general remedies, though the existing inflammation does not materially affect the circulation or threaten life—viz., when the part affected by the inflammation is an organ of such extreme delicacy that the continuance of inflammation in it would destroy its functions. This is the case in inflammation of the internal parts of the eye, when the most active measures are necessary to save the organ from destruction.

992. As a general rule, then, it may be stated, that blood-letting is required in robust and plethoric persons, and when inflammation is accompanied with increased action of the heart, or when some function essential to life is impeded, or some delicate organ threatened with destruction. In most other cases, general bleeding will be unnecessary.

993. The second indication—that of causing the small vessels to contract on their contents—may be accomplished in various ways; locally, by pressure, cold, astringent applications, and the cautious use of substances which themselves cause inflammation, but act as gentle stimulants when applied in small quantity, and for a short period; and generally, by remedies which experience has shown to possess that property.

994. If the vessels are much distended with blood, local depletion is indicated as a preparatory measure. When the small vessels have been by this means partially emptied of their contents, we may apply the remedies just mentioned according to the nature of the inflamed *part*. Pressure, properly applied, lends support to the vessels, and

gives them time to contract; cold acts on all the textures of the part, on the vessels as well as on the nerves which supply them; astringent applications cause all the textures to contract, at the same time that they gently irritate the vessels, and excite them to the performance of their proper function; whilst the direct irritants, as nitrate of silver, and the sulphate of zinc and copper, prove beneficial simply by their stimulating property.

995. All these applications have been used with advantage—pressure, in chronic inflammation and ulceration of the extremities, and in swelled testicle; cold, in every form of external and internal inflammation, as in common phlegmonous inflammation of the skin, in the inflammatory sore throat of scarlatina maligna, in the inflammation of the fauces attending hydrophobia, in inflammatory diseases of the rectum and vagina; astringents, in common or specific inflammation of the mucous membranes; stimulants, in phlegmonous inflammation of the skin, to the surface of irritable ulcers, and to the mucous membranes in the form of injection.

996. The general remedies which promote the contraction of the capillaries (that is to say, remedies which act through the system and not by local application), are the metals, especially tartar-emetic, mercury, and arsenic, which, like iodine, act on the capillaries of every part of the body; also in a less degree, the fixed alkalis, and their salts; and certain remedies which affect particular organs, as uva ursi, copaiba, cubebs, pepper, cantharides, and turpentine.

997. The first class of remedies (tartar-emetic, mercury, arsenic, and iodine), when applied to the skin, excite inflammation; this shows the power which they exercise over the capillaries: they are also capable of being absorbed and taken into the circulation, and consequently they are applied to the capillaries in the most direct manner. Hence, when administered internally, they may be presumed to have the same power of curing inflammation which nitrate of silver has when locally applied.

998. The cases in which one of these remedies is more applicable than another are found out empirically. Tartar-emetic is to be preferred in common inflammation, mercury and iodine in specific inflammation. Mercury has the preference over all other remedies in cases of great urgency, when no time is to be lost, and our object is not merely to subdue the existing inflammation, but to suspend specific disease, of which it is a part. Hence the use of mercury in iritis and croup.

999. Uva ursi, copaiba, cubebs, and black pepper, are all employed with great advantage in inflammation of the mucous membrane of the urinary passages. They act as direct stimulants through the urine, and when given in sufficient doses, cure gonorrhœa, even in its acute stage. Uva ursi is used chiefly in inflammation of the mucous membrane of the bladder; copaiba and cubebs in gonorrhœa, in which disease pepper has been employed by Dr. Billing with equal advantage,

and black pepper in hæmorrhoids. Copaiba has also been prescribed with advantage in cases of bronchitis.

1000. *Hæmorrhage* differs little from inflammation in the treatment which it requires. Active hæmorrhage demands the same remedies as acute inflammation, and passive hæmorrhage may be cured by the same means which are found useful in some forms of chronic inflammation—viz., astringent remedies, such as cold, the preparations of lead, and the several medicines which contain tannin as their active principle.

1001. The treatment of *febrile affections* is governed by the same general principles which preside over the treatment of inflammation. When they are free from the complication of local disease, and are attended by a frequent, full, and hard pulse, depressing remedies, as bleeding and tartar-emetic, separate or combined, are indicated: but in those cases, where there is great prostration of strength, with a small and frequent pulse, tonics or stimulants, according to the degree of the existing debility, will be required. Local disease must be treated by general or local remedies, according to the powers of the system, with the general precaution that the strength of the patient must be husbanded as much as possible, in order that he may not be worn out before the disease has run its appointed course. The same remark applies with equal force to those febrile affections of which local inflammations form a constituent part, as the febrile exanthemata, measles, scarlatina, small-pox, and erysipelas.

1002. The process of *secretion* is one over which medicine exerts much power either directly or indirectly. The most important secretions are those of the lungs, skin, and kidneys. The aerial secretions of the lungs not being subjects of observation or measurement at the bedside, yield in point of importance to the two latter.

1003. The nature of the process of secretion, and of the influence which remedies have upon it, will be best understood by selecting the secretion of the skin as an example. When the skin is red, hot, and dry, we can excite perspiration by the cautious application of cold; when it is pale, cold, and dry, by the application of heat. In the one case we diminish the size of the capillaries, and consequently the quantity of blood which they contain; in the latter, we increase both. In the same conditions of skin, and in the same states of the system, we can produce the same results by depressants, on the one hand, and by stimulants on the other. It appears, then, that in the case of this important secretion, we can produce the same effect by a local application and by a remedy internally administered. In these cases of local application, the temperature of the skin favourable to sweating is intermediate between the two opposite conditions, accompanied by the dry skin. So also, in the case of the general remedies, the temperature of the skin is brought to the same intermediate condition by the depressants, on the one hand, and by the stimulants,

on the other. This state of the skin might be termed the "sweating point."

1004. It is true that this point is not fixed, for it must vary in different persons, not only with the temperature of the skin and the quantity of blood circulating through the capillaries, but with the condition of the capillaries themselves; so that in strong and robust persons it must be, so to speak, much higher than in those worn out by disease; while in extreme debility it is well known that cold sweats take place from mere relaxation of the capillary vessels, when the temperature of the body is extremely low.

1005. It appears, then, that increased secretion from the skin may be brought about by remedies which act upon the general circulation, and this fact may be extended by analogy to other secretions also. Thus, blood-letting, practised in a case of inflammatory fever, will promote the flow of all the secretions, by bringing the capillaries of all the organs to what may be termed their secreting point.

1006. In this place it is necessary to enter a protest against the anxiety often entertained by the practitioner to obtain diaphoresis. Sweating is, no doubt, a good sign, and a useful thing whenever the skin is hot and dry; but as in the administration of so-called diaphoretics, the sweating is the necessary consequence of the change which has been effected in the general circulation, our anxiety should be, not to procure diaphoresis, but to bring the circulation into that state in which sweating is possible. Thus, when the skin is hot and dry, we select a depressant, when cold, a stimulant diaphoretic. On the same principle, we select a stimulating diuretic in languid states of the circulation, and a depressing one where there is strong febrile action.

1007. It is not meant to assert that all remedies which promote secretion act only through their influence on the general circulation, for the strong analogy which may be drawn from the local action of remedies on the capillaries in inflammation must admit of application to other states of those vessels; and as it is probable that secretion does not depend upon the mere size of the vessels and the quantity of blood circulating through them, but also on the condition of their coats, there is good ground for believing that some remedies act directly upon the capillaries themselves. The virtue of tartar-emetic may, perhaps, depend on the effect which it produces on the capillaries themselves, as well as on the general circulation, although in the majority of cases the latter explanation appears sufficient.

1008. There is, indeed, one case in which the action of remedies in promoting secretion appears to depend almost exclusively upon the adaptation of the remedy to the quality of the secretion itself. For instance, the urine is a secretion which abounds in salts, and it is well known that saline medicines are of great efficacy in promoting that secretion: the perspiration, too, contains salts, though in less quantity; this secretion, therefore, like the urine, may, perhaps, be increased

by the use of remedies of which salines form a part. Thus, Dover's powder may possibly derive part of its efficacy from the sulphate of potash which it contains.

1009. Admitting, then, that the secretions may be promoted both by general remedies and by remedies acting locally on the capillaries of the secreting organ, it is important to distinguish the two cases, and to bear in mind that in disease affecting the general system, it is not so much our object to promote the flow of the secretions as to bring about that state of the circulation in which secretion takes place as a necessary consequence.

1010. The remedies adapted to promote the *absorption* of fluids thrown out into the several cavities of the body, act for the most part through the general system. Of these the most powerful remedy is blood-letting, which acts by diminishing the quantity of the circulating fluid, and when the cause of dropsy is of an inflammatory nature, by removing the inflammation. The other remedies in common use are employed with the same views. They consist of medicines directed to the several secreting organs, especially the bowels, kidney, and skin. The increased secretion from these parts has the twofold effect of blood-letting—that of diminishing the quantity of the circulating fluid and of subduing any inflammation which may exist.

1011. Where much general debility is present, it may be necessary to combine tonics or stimulants (for stimulants are tonics to the debilitated) with depletion. To proportion the one to the other, much judgment and care are necessary.

1012. The local means best adapted to promote absorption, are those which stimulate the capillaries and parts affected, such as friction with the hand, or with stimulating liniments, tincture of iodine, a jet of cold water, or the electric spark. It is of little consequence to inquire whether these agents act by restoring the capillaries to their healthy state, or by stimulating the absorbents. (See § 363.)

4. REMEDIES ADAPTED TO THE REMOVAL OF THE SOLID STRUCTURES OF THE BODY.

1013. Morbid growths have been divided (see § 399) into analogous and heterologous. Experience shows that we have little or no power over the latter class; they form one of the opprobria of medicine, and where they cannot be removed by the knife, we can do nothing more than alleviate the sufferings which they occasion. The same observation extends to such analogous formations as do not consist in a mere hypertrophy of a natural texture.

1014. Atrophy and hypertrophy, indeed, seem to be the only alterations of the solid structures of the body which are at all under the control of medicine. The remedies applicable to the restoration of a *part from* the condition of atrophy are, exercise, friction, electricity,

and, in short, all those means which increase the flow of blood to the part and promote its natural actions. The remedies, on the other hand, which are of use in hypertrophy are, rest, pressure, cold, local abstraction of blood, and preparations of mercury and iodine.

1015. The rationale of the action of the first-named remedies is obvious, but there is some difficulty in explaining the efficacy of mercury and iodine in promoting the absorption of solid textures. Are the capillaries contracted by these medicines so as to diminish the quantity of blood circulated through the part, and to a degree which is incompatible with secretion?—or are the absorbents stimulated to increased activity? The former supposition appears the more probable, and is more in conformity with what we know of the functions of the capillary vessels. The question, however, is of no immediate practical importance.

5. REMEDIES WHICH ACT UPON THE NERVOUS SYSTEM.

1016. As all the functions of the body are more or less dependent upon nervous influence, it follows that all remedies possessed of active properties must affect the nervous system. All the medicines, therefore, which have already been mentioned under preceding sections belong with equal right to this. Stimulants, depressants, sedatives, narcotics, and some medicines, at least, which belong to the class of tonics, affect the circulation through their action on the nerves; and even those remedies of which the action is strictly local act locally on the nerves, and through them, on the vessels to which they are distributed. But there are some substances which exert so peculiar an influence on the nervous system as to demand a separate notice in this place.

In the action of medicines on the nervous system, we recognise three marked varieties. Some exalt the nervous energy, and produce a state of general excitement in all the functions of the nervous system; others soothe the nervous system, tranquillise the mind, and procure sleep; while a third class displays its power chiefly on the nerves supplying the important organs of circulation and respiration, while they tend to derange the functions of the brain, and to occasion delirium. The first class are known as *stimulants*, the second as *narcotics*, and the third as *sedatives*.

1017. (1.) *Stimulants.*—The mode in which these remedies affect the body, and the cases in which they may be used with advantage as medicines, have already been pointed out when speaking of the action of medicines on the organs of circulation (§ 962). It is only necessary to add, in this place, that these remedies not only affect the circulation in the manner already described, but also all the functions of the brain, spinal cord, and nerves. The most active and efficient stimulants are ammonia and its carbonates, and phosphorus; musk; mustard and turpentine; to which may be added the more active and diffusible substances contained in the class of narcotic medicines, namely,

alcohol, ether and chloroform, and camphor, which stimulate the system as their first effect. To these may be added, as special stimulants affecting the spinal cord and nerves of voluntary motion, the alkaloids strychnia and brucia, and the plants which contain them.

1018. (2.) *Narcotics.*—The *narcotics*, of which opium, and its alkaloid, morphia, are the chief, and lactucarium, the hop, and the nutmeg, the less important, are employed to relieve pain, when they are called *anodynes;* or to soothe irritation, when they are termed *paregorics;* or to diminish inordinate muscular contraction, in which case they are called *antispasmodics;* or, lastly, to procure sleep, when they receive the name of *hypnotics*, or *soporifics*. Opium combines a stimulant with a narcotic principle; hence it is admirably adapted to the state of irritation, accompanied by much debility, the narcotic soothing the excitement, while the stimulant principle counteracts the existing debility. Sulphuretted hydrogen, carbonic acid, carbonic oxide, and cyanogen gas, act also as narcotics. As such carbonic acid gas has been locally applied.

1019. The remedies which occasion sleep or stupor as their principal symptom, or as one of their leading symptoms, are sometimes grouped together under the one head of narcotics, which is then subdivided into smaller groups; such as *inebriants*, *soporifics*, and *deliriants*. The first group (inebriants) comprises alcohol and alcoholic liquors, chloroform and the ethers, camphor, and the Indian hemp, to which may be added tobacco and lobelia inflata. All of these remedies produce the phenomena of intoxication; but while the first-named act first as stimulants, the last two, tobacco and lobelia, have the opposite effect of depressants. The second group (soporifics) contains only one medicine of importance, opium; lettuce, hops, and nutmeg being of inferior value, and therefore rarely used. The third group (deliriants) comprises hyoscyamus, belladonna, and stramonium. These substances, it is scarcely necessary to observe, are not given in the practice of medicine in such doses as to occasion delirium. If classed according to their use as medicines, they would rank with sedatives. Of these three groups the first and second are the most important: the first as containing the invaluable *anæsthetic* chloroform; the second, the scarcely less valuable drug, opium.

1020. (3.) *Sedatives.*—The class of *sedatives* comprises many substances allied in some of their properties to the narcotics, and in others to the depressants. They differ from the narcotics in not producing sleep, but, on the contrary, delirium, in some of its many forms. Thus, hyoscyamus, belladonna, stramonium, monkshood, black hellebore, veratria, colchicum, and camphor, to which perhaps musk and valerian may be added, give rise to delirium in the first instance, which is sometimes followed, after a considerable interval, by coma. Tobacco, ipecacuanha, conium, squills, and digitalis, appear to produce coma without previous delirium. Tobacco, ipecacuanha, and squills, and the lobelia inflata, have been already described as depressants, and

have been shown to have a remarkable effect on the muscular system. Tea and coffee belong to the class of sedatives. But the class contains no more important member than cold.

1021. Cold has already been mentioned more than once, when speaking of the effect of medicines on the circulation, as a remedy of great power (§ 981). But cold produces a marked sedative effect on the nervous system, without any corresponding effect on the circulating organs. It blunts sensibility, and therefore subdues pain. Applied suddenly, it is an effective shock, and rouses both the body and mind. Hence the efficacy of cold water dashed in the face in hysteria, where all that is necessary to remove a paroxysm is strongly to excite attention and an effort of self-control: hence, also, its use in syncope and asphyxia. In the disorder of the nervous system which follows severe inflammatory diseases of the brain, it forms a most effective stimulus, rousing the nervous system, and gradually restoring all the functions of the organ. In cases of violent nervous excitement, on the other hand, it acts as a powerful sedative, allaying the irritation of the nervous system, and reducing the frequency of the pulse, subduing the most violent pain, and infallibly procuring sleep. Such are its effects in the most violent paroxysms of mania.

Having thus briefly indicated the chief remedies which affect the nervous system, it will be useful to speak more particularly of the action of remedies on the special functions of the nervous system, sensation and voluntary motion.

1022. The remedies which act upon the *nerves of sensation* are classed by the toxicologist with narcotic or narcotico-acrid substances; but in works on materia medica they are considered as sedatives. Of these aconite is the most powerful. It produces numbness, accompanied by a tingling sensation in the parts to which it is applied. Strong hydrocyanic acid, locally applied, also produces numbness; opium and belladonna, too, act locally on the nerves of sensation; hence their use in neuralgia. Chloroform also acts powerfully as a local anæsthetic, after producing, as its first effect, redness and heat of surface. But the best and most powerful local sedative is cold. It is more sure and manageable than any other, and, with proper precautions, may be applied whenever such remedies are indicated.

1023. Belladonna, and other active principles from the class of narcotico-acrid poisons, also possess a power of causing dilatation of the pupil through their operation on the retina, whether they are given internally or applied directly to or near the eye.

1024. The *nerves of voluntary motion*, and through them the muscular system, are powerfully affected by remedies in three different ways—with paralysis, convulsions, and tonic spasms.

1025. Extreme debility of the muscles is the familiar effect of all depressing remedies, and especially of tobacco. The same effect is produced by tartar-emetic among mineral poisons, and by tobacco and lobelia inflata among vegetable poisons. Paralysis is produced by

various poisons, as the woorara, ticunas, and curare, by large doses of conium and stramonium, and by one metallic poison—lead.

1026. Convulsions are produced by almost all the narcotico-acrid and irritant poisons: they precede the fatal event in quick poisoning by hydrocyanic acid. They occasionally occur in the course of poisoning with opium; and they are present in poisoning with arsenic and the more active mineral poisons.

1027. Tetanic spasms are produced by nux vomica, by St. Ignatius' bean, by the upas tieuté, and by the active principles strychnia and brucia. They are an occasional effect of monkshood, and of the ergot of rye taken in poisonous doses. They are also sometimes present in cases of poisoning by the more active irritants.

1028. The muscular contractions of the uterus produced by the secale cornutum furnish an example of local action on the muscular fibres, of which much advantage is taken in the practice of midwifery.

1029. The treatment of diseases dependent upon, or accompanied by, local affections, with reflex action of the muscles, is of much importance, and in this respect the theory of the excito-motory system is likely to confer great practical benefits on medical treatment. The importance of attending to the local affections in tetanus and hydrophobia, for instance, can scarcely be overrated. In the latter disease, ice has been, in more than one instance, swallowed with great relief to the symptoms.

1030. Many of the metallic substances used in medicine appear to exert a peculiar influence on the nervous system. They are remedies which act locally as irritants, and when administered in small doses, and during a considerable period, as tonics: as such, they have been used with advantage in chorea and epilepsy. Arsenic, copper, iron, silver, and zinc, belong to this class.

5. THE MEANS OF PRESERVING, IMPROVING, AND RESTORING HEALTH.

1031. In a large proportion of the cases which come under the care of the physician, both in private practice and among the poor, it is necessary to pay some attention to those circumstances which affect the general health of the patient, and to lay down rules for his guidance in matters which belong rather to the province of Hygiène than to the Practice of Physic. Indeed it often happens that the only remedial measures which the physician feels called upon to prescribe consist of a change from bad to good habits of life, from an unhealthy residence or locality to one more conducive to health, from intense application to study or business to repose of mind and complete change of scene and occupation. In a very numerous class of cases, again, change of climate is the appropriate remedy, and the physician is *required* to make choice of a locality suited to the disease or state of

health of the patient. The subject of *climate*, therefore, falls to be considered in this place. The preservation of health and prevention of disease among bodies of men, such as emigrants, soldiers and sailors, and the inmates of workhouses, prisons, hospitals, and lunatic asylums, among women in lying-in hospitals, and among children in schools and foundling-hospitals, is also an important duty, in the right performance of which many medical men are directly interested. This subject, therefore, will be noticed in its proper place.

1032. The principal matters which require to be regulated with a view either to the preservation of health in the strong, or its restoration in the invalid, are diet, exercise, clothing, condition of dwelling, place of residence, and habits of life.

1033. On the subject of *diet*, as applicable to particular maladies and states of system, something has already been said (§ 916).

1034. *Exercise*, regulated according to the condition of the patient, is one of the most important of our therapeutic agents. It may be of two kinds—*active* or *passive:* in the one case the patient moves about by the exertion of his own muscles, in the other he is borne from place to place. Walking, running, dancing, rowing, fencing, boxing, wrestling, and all gymnastic exercises and active games, belong to the first class; carriage exercise, sailing, rocking, and swinging to the second. Riding at a foot-pace belongs also to the class of passive exercises; while the paces which require more exertion combine the advantages of the two classes.

1035. Both kinds of exercise call the muscles into play, at the same time that they promote the circulation of the blood. In passive exercises the muscles are employed in maintaining the posture of the body, and the circulation is quickened by the displacement of the blood which accompanies each sudden change in the level of the body.

1036. In addition to the advantage derived from the promotion of the circulation of the blood, active exercises, by calling the abdominal muscles into play, promote the natural action of the bowels. Those exercises, too, whether active or passive, which are carried on in the open air, have the incidental advantage of supplying a purer air for the purpose of respiration. They also imply a change of scene and occupation, which reacts favourably on the mind of the invalid.

1037. In selecting the kind and amount of exercise to be prescribed, the physician must be guided by the circumstances of each particular case. In the absence of organic disease, and where the patient suffers merely from general debility, brought on by overwork, intense study, or too close an attention to business, the choice of an appropriate exercise must be mainly determined by the circumstances and tastes of the patient himself. If practicable, change of air and scene, with the exercise which travelling implies, should be insisted on; and, where the strength allows of it, pedestrian exercise. A sea voyage is in these cases to be preferred to carriage exercise. When the patient is unable

to quit the scene of his studies or business, horse exercise in the morning or evening of the day will be found the most suitable; and this is especially the case with the inhabitants of large cities who cannot readily reach the country on foot. Fencing, rowing, quoit-playing, archery, and cricket, have the double advantage of bringing all the muscles of the body into play, and of compressing a great amount of exercise into a small compass of time. Archery deserves encouragement as an exercise suited to persons of either sex.

1038. In the case of growing children of delicate health, exercise is of the greatest importance, and the active games of childhood, or equestrian exercise, may be combined with instruction in the graceful accomplishments of dancing and fencing. It often happens in these cases that much anxiety is felt respecting the healthy development of the chest, especially where a tendency to consumption is supposed to exist. With a view to promote this important object the manly exercise of fencing may be strongly recommended for young men, and the nearest convenient approach to it for young females. It is greatly to be preferred to dumb-bells, to the clubs, or to other analogous exercises which consist of tedious repetitions of the same movements. Reading aloud, so strongly recommended by ancient medical authorities, might be revived with great advantage; but in order to guard against the formation of habits of reading injurious to the free play of the lungs, a judicious teacher should be engaged. Singing properly taught has the same recommendation.

1039. In patients labouring under organic disease of the lungs or heart, all the stronger exercises, whether active or passive, are inadmissible. Walking on level ground is, in such cases, the strongest exercise which can be safely prescribed, and is greatly to be preferred to almost any form of passive exercise except that of the carriage or garden chair. Running, or even walking at a brisk pace, and all athletic sports are inadmissible. The more violent exercises, especially rowing in races, have often given rise to these diseases in persons having every appearance of strength and vigour. Gymnastic exercises, requiring a prolonged and violent action of the same muscles, are also open to the same objection.

1040. On the subject of *clothing* much misapprehension exists. There is a strong tendency towards over-clothing of the body, and especially of the chest, with a view of guarding against pulmonary disorders; and in order to avoid the danger of catching cold, a delicate patient is often made to wear, in the very height of summer, as many flannels and skins as would guarantee the temperature of the body in a polar winter, and in this way the very risk is incurred which it is deemed so important to avoid. The same error is committed by heaping on the patient a load of bed-clothes, much exceeding what is required to preserve the proper temperature of the body; and by causing him to wear flannel next the skin at night.

1041. An opposite error is sometimes committed in very young

children, under the erroneous notion of hardening them, but in forgetfulness of the comparative difficulty with which young persons maintain their proper temperature. At the other extreme of life, also, warm clothing is highly necessary, and especially in patients suffering from pulmonary affections. In these cases it is also highly necessary in severe weather to keep up the temperature of the sleeping apartment throughout the night.

1042. A similar error is committed by young men, when they persist in wearing no other covering to the chest throughout the year but the linen shirt, and refuse to wear cotton or flannel next the skin in winter. In persons subject to perspire freely, a thin cotton vest next the skin should be worn even in summer; and in hot climates cotton is the proper material for body-clothing.

1043. The importance of an immediate change after exercise accompanied by profuse perspiration, or when the clothes are wet, needs not to be insisted on.

1044. The *condition of his dwelling* is of great importance to the invalid. The points to be attended to in choosing a house, or in planning a residence, are chiefly the following:—

Site and *soil*.—Where there is a free choice, a gravelly or chalky soil and sloping ground are to be preferred to a clay soil and low level site. A tenacious clay soil, or a rich alluvium, or a dry surface soil with water at a short distance beneath, should be avoided, but especially the flat banks of rivers or streams, or the flat base of hills, as well as all marshy spots, and the neighbourhood of stagnant water. The worst combination of site and soil is a flat rich alluvial deposit between a hill and a stream. Such spots are favourite haunts of continued fevers, as marshes are of agues. This combination exists in an extreme degree on the south bank of the Thames, to the great detriment of the health of the inhabitants, and the encouragement of every epidemic pestilence.

Aspect.—In England, a south aspect is to be preferred to all others, as being free from the extremes of heat and cold; and it is admirably suited to the invalid. A north aspect lacks both light and warmth. An east aspect has the advantage of the light and warmth of the morning sun, but it is exposed to the cold drying winds of winter. A west aspect is open to the objection of being too hot in the after part of the day. In houses which can have only two opposite aspects, a south-east and a north-west aspect are to be preefrred. When there is perfect freedom of choice, a morning room to the east, the principal sitting-room to the south, with bed-rooms to the south for invalids and aged persons, and to the east for young and healthy ones, is a desirable combination. Larders and store-rooms should be to the north.

Shelter.—Houses require shelter from the north and the east. When such shelter is not afforded by nature, it may be obtained by plantations, which should in no case be so near the house as to obstruct the free movement of the air, or to endanger the foundation of the building by the growth of the roots. To the south and west the house should be

open; but large trees at a moderate distance from the house, on the west side, afford a grateful shade from the heat in summer.

Water-supply.—A good supply of clear, colourless spring water, and a supply of rain-water amounting to at least ten gallons per head per diem for a month are great desiderata.

Drainage.—The soil upon which the house stands should be thoroughly drained, and all offensive refuse should be promptly removed by impervious drains properly trapped. Water-closets should be so placed that, if possible, the drains should not pass under the house.

The preservation of our dwellings from dampness is of the very first importance. To accomplish this end, it is not sufficient to make the roof of the house proof against the weather, the basement also requires to be attended to. The floor or pavement should be raised on dwarf walls, supplied with air-bricks, and the house should be surrounded by an area or air-drain, so that the walls may be preserved from contact with the soil. These precautions are especially necessary in clay and rich alluvial soils.

Light and *air.*—The rooms should be lofty and spacious, furnished with open fire-places, and windows opening above and below; and staircases should be well lighted and well aired by windows opening upon them. Staircases lighted by sky-lights, even when the lights admit of being open, are objectionable, unless they are very spacious. The purity of the air of the several apartments, and especially of the bedroom of the invalid, should be guaranteed by means of *ventilation.* To this end no inhabited room should be without an open fire-place, for the escape of impure air. When the rooms are spacious, no further provision for ventilation is required beyond the facility of opening doors and windows. But small apartments used as sleeping-rooms require a constant provision for the renewal of the air by means of ventilators constructed with a view to the prevention of drafts.

1045. In those cases where it is deemed necessary to maintain an equable temperature, close stoves should on no account be employed. An open fireplace of sufficient size, and double windows, or, what answers equally well, double panes of glass, or thick plate glass, are greatly to be preferred. In this way any temperature which may be desired can be combined with the advantage of complete ventilation. This mode of insuring a warm pure air is of great importance in pulmonary diseases, especially in the bronchitis of aged persons.

1046. With a view to the preservation of the health of young and delicate children, it is essential to provide for the free ventilation of their sleeping apartments. Overcrowding and consequent impurity of the air in such apartments is a common cause of disease in the children even of affluent persons, and the principal source of the high mortality of the children of the poor. In addition to the precautions for insuring *thorough* ventilation of sleeping apartments, a certain amount of space,

not falling short of the thousand cubic feet insisted on in § 238 should be allotted to each child.

1047. In cities, and even in rural districts, the external air admitted into the houses both of rich and poor, is often very far from being sweet or pure. In the country the causes of impurity are few in number, being chiefly the gases from stagnant pools, ponds, or marshes, or the effluvia from farm-yards, stables, pig-sties, or heaps of manure. These sources of impurity should always be placed at some little distance from dwelling-houses; at any rate, they should not be suffered to remain in contact with them.

1048. In large cities the sources of aerial impurity are much more numerous. In addition to those which exist also in rural districts, but become doubly objectionable from narrow space and imperfect movement of the air, there are others which arise from processes of manufacture peculiar to towns, from the necessity of heaping up, at least for a short time, the dust and ashes removed from our houses, and from the difficulty of consuming the smoke issuing from our chimneys.

1049. Among the *habits of life* which most militate against health, and which, so long as they remain unchanged, tend to counteract the effects of the best medical treatment, the most important are sloth, luxury, dissipation, indulgence in the pleasures of the table, the abuse of spirituous liquors, opium, and tobacco, irregularity in the time of taking meals and rest, and want of personal cleanliness.

1050. For those persons whose constitutions have been undermined by sloth, luxury, and dissipation (chap. I., § 81), travelling and the wholesome observances of fashionable watering-places, such as early rising, regular hours for meals and exercise, the frequent use of baths, and cheerful and congenial society, are the only remedies of any value which the physician has it in his power to prescribe. As intemperance and indulgence in the pleasures of the table are the besetting temptations of the same class of persons, there is perhaps no better way of guarding against them than by prescribing foreign travel, or a residence at fashionable watering-places.

1051. When the abuse of spirituous liquors, of opium, and tobacco is brought under the notice of the physician as a cause of disease, steps should be taken to abolish these bad practices in a slow and gradual manner, not merely on account of the greater safety of this procedure, but also because of the greater ease with which the patient may thus be made to lay his habits aside.

1052. Irregularity in the time of taking meals and rest is an evil incident to the active and busy life of large cities, and one which the physician is often called upon to remedy by prescribing such improved habits of life as are compatible with the exigencies of the patient's business.

1053. A want of personal cleanliness is more frequently chargeable against persons of education than might at first sight be expected. The practice of daily ablution of the whole body is observed by a comparatively small number of persons; but it is one which ought to be insisted upon as an excellent tonic, as tending to guard the body against catching cold, and as keeping the skin in a proper state for the performance of its functions. The occasional use of the warm bath, to insure a more perfect cleansing of the skin, is also to be recommended. The practice of daily ablution with cold water, followed by friction with a rough towel, or hair gloves, or the flesh-brush, is often of the greatest benefit to those who have an hereditary predisposition to consumption, or who have already manifested a tendency to that disease.

1054. The subject of *change of air or climate* is generally esteemed one of the most important among the means of preserving, improving, and restoring health. There are two classes of persons to whom it is usual to recommend a change of climate. The one class consists of invalids who suffer from no defined disease, but whose general health has been impaired by exposure to one or other of the many unwholesome influences which attend a residence in large towns (see § 66 and seq.); the other class consists of persons suffering from some well-defined malady, such as chronic dyspepsia, chronic rheumatism, scrofula, pulmonary consumption, chronic bronchitis, and asthma.

1055. To the mere invalid, whose constitution has suffered by the cares and anxieties of business, the dissipation of a town life, or the *ennui* of an idle and useless existence, change of climate is chiefly valuable as affording facilities for change of habits, change of scene, and change of occupation. In advising persons so circumstanced, little more is required than to avoid climates positively unhealthy. With this exception, the countries or places which offer the greatest facilities for change of habits and occupation; and in the case of the victim of *ennui*, the greatest facilities for exertion of mind and body, are to be preferred.

1056. In advising patients suffering from any of the diseases just specified, a more exact knowledge of climate is required, at the same time that many considerations of personal convenience will have to be carefully weighed. Assuming that there are no circumstances peculiar to the patient which render a change of residence inexpedient, the medical man will have first to consider the kind of climate best adapted to the disease under which the patient suffers, and then to select from a number of places possessing the required climate the particular one which is, on the whole, to be preferred.

1057. In making choice of a climate, we may either consider the state of the patient's system, without reference to the disease under which he labours, or we may be guided solely by the nature of his malady. The state of the system may be either one of relaxation, characterised, *if the* disease affect any of the mucous membranes, by excessive secre-

tion; if the glandular system, by indolent swellings or ulcers; if the skin, by chronic cutaneous affections; if the locomotive system, by chronic rheumatism and atonic gout. A cold skin, and a weak pulse often below the natural standard of frequency, with general langour of all the functions of the body, characterise this state. On the other hand, the state of the system may be one of irritation, with a dry state of the mucous membranes, a harsh dry skin, and a frequent quick pulse, with a tendency to more acute forms of inflammation. In the state of relaxation, a dry bracing climate is indicated; in the state of irritation, a mild moist climate. In both states of system, it is important to avoid a great increase of temperature as tending to exhaustion, sudden changes of temperature as giving rise to colds and slight febrile attacks, and the east and north-east winds, as shown by experience to be peculiarly trying to the invalid.

1058. These observations will apply to all the diseases in which change of climate is commonly recommended, with the exception of chronic rheumatism, gout, and calculous disorders, in which a higher temperature appears to be advantageous. The climate of the East and West Indies, and of the Cape of Good Hope, is deemed suitable to this class of invalids.

1059. As a general rule, the bracing spots adapted to a state of relaxation of the system are those which are elevated, scantily wooded, exposed to the prevailing winds, and consisting of a gravelly or chalky soil; on the other hand, the mild moist climates are to be found in low situations, on clay soils, wooded, and partially or wholly uncultivated, and sheltered from the prevailing winds. As a general rule, too, the climate of the sea-shore is milder and more uniform than that of the interior, being warmer in winter and cooler in summer. Watering-places have also the twofold advantage of pure sea-breezes and of sea-bathing.

1060. Bearing these considerations in mind, it will be easy to point out, among the more common resorts of the invalid, the places in England and abroad which are best adapted to the two opposite states of relaxation and irritation.

1061. The mild sheltered places chiefly resorted to on the coasts of England are Undercliff in the Isle of Wight; Hastings on the south coast; Dawlish, Sidmouth, Exmouth, and Salcombe, on the coast of Devonshire. The sheltered spots in the islands of Guernsey and Jersey offer the same advantages. Among foreign watering-places, Pau in the south-west, and Hyères and Nice in the south-east of France; Rome and Pisa in Italy; Malaga in the south of Spain; and the islands of the Northern Atlantic, namely, Madeira, the Canary Islands, and the Azores; and those of the Western Atlantic, namely, the Bermudas and the Bahamas, have the same mild relaxing climate.

1062. On the other hand, the mild bracing spots adapted to invalids suffering from a state of debility and relaxation without irritation, are,

in England, Brighton, on the south coast; Torquay, on the coast of Devonshire; Clifton, on the western coast; in France, Montpellier; and in Italy, Naples.

1063. The places named in the two preceding sections must be understood to be intended chiefly for winter residence, the summer being spent in suitable inland watering-places, such as Malvern, Cheltenham, Leamington, Tunbridge Wells, Matlock, and Buxton, in England; or in any of the several watering-places among the higher Pyrenees in France, or the better-situated spas of Germany.

1064. The climate best adapted for a residence continued during the entire year is perhaps that of Madeira, which to moderate fluctuations of a temperature little exceeding that of the milder parts of England, adds the advantage of a drier atmosphere, except during the prevalence of the autumnal rains.

1065. The diseases in which change of climate may be expected to be most beneficial are emphysema, chronic bronchitis, and asthma, and all those affections of the air-passages and lungs in which previous experience has shown that the patient suffers severely in winter and is comparatively well during the summer. The efficacy of change of climate in all the stages of pulmonary consumption, from the incipient to the most advanced stages, is a subject of great difficulty: but there is no doubt that in that condition of health known as tubercular cachexia (the presumed forerunner of tubercular deposit) as in other forms of cachexia, change of climate is advantageous. Whether a mild bracing or a mild relaxing climate is to be chosen will greatly depend upon the state of the system, whether it be one of langour and torpid action, or one of feverish excitement.*

1066. There are certain conditions of system in which it is expedient to combine with change of climate the alterative effects of minute doses of saline or other substances in a state of solution; in other words, to select as the scene of the required change of climate, regimen, and occupation, some spot where access can be had to mineral waters. Such places abound both in England and on the Continent.

1067. The *mineral waters* most in repute may be divided into four classes—*the saline*, *the chalybeate*, *the sulphureous*, and *the acidulous*, to which may be added the *hot springs*. A short description of each of these classes, with the principal watering-places where they are found, will assist the physician in his choice.

(1.) *Saline Mineral Waters.* These consist of variable quantities of the chlorides, sulphates, carbonates, and nitrates of potash, soda, lime, magnesia, and alumina, to which may be added, as of rare occurrence, free carbonic or sulphuretted hydrogen gas, the salts of iron, in small quantity, with traces of phosphoric acid, iodine, and bromine. Sea-water is a concentrated form of this class of mineral waters. These mineral waters act as gentle aperients, and are

* Consult, on the subject of Climate, Sir James Clark's able treatise.

adapted to the case of patients suffering from dyspepsia, from habitual constipation, and from functional derangement of the liver. The waters of Cheltenham, Leamington, and Scarborough, in England; of Spital-on-Tweed, Pitkaithley, Airthrey, Dunblane, and Innerleithen, in Scotland; and of Ems, Carlsbad, Homburg, Seidschutz, Kreuznach, and Pülna, in Germany, belong to this class. Some of these mineral waters contain minute quantities of iodine and bromine, and, for that reason, commend themselves in scrofulous disorders, accompanied by glandular enlargements. The waters of Kissingen and Kreuznach contain the bromide of sodium in sufficient quantity (a third and a fourth of a grain in a pound of water) to have some effect if taken freely and for a continuance. The strongest waters belonging to this class are, in England, those of Cheltenham and Leamington; in Scotland, those of Airthrey; in Germany, those of Pülna, Seidschutz, Homburg, Kreuznach, Kissingen, and Marienbad.

(2.) *Chalybeate Waters.* These waters contain variable quantities of the sulphate and carbonate of iron, and are, therefore, possessed of tonic properties, and are especially adapted to the treatment of anæmia, and of functional disorders of the uterus. They are slightly stimulating, and require to be combined with aperient medicines. The waters of Tunbridge Wells and Harrogate in England, of Hartfell Spa and Vicar's Brig in Scotland, of Spa and Tongres in Belgium and the Low Countries, of Passy near Paris, and of Rennes in the south of France, belong to this class.

(3.) *Sulphureous Waters.* These waters abound in free sulphuretted hydrogen gas, and are prescribed in several forms of cutaneous disorder. The waters of Harrogate in England, of Moffatt, Strathpeffer, and Rothsay in Scotland, of Enghien near Paris, of Barèges in the Higher Pyrenees, of Aix and Leuk in Switzerland, and of Aix la Chapelle in Prussia belong to this class.

(4.) *Acidulous Waters.* These waters are characterised by the quantity of free carbonic acid which they contain. They are also more or less rich in saline ingredients; so that they might be placed with almost equal propriety with those enumerated in Class 1. The excess of free carbonic acid constitutes their claim to a place by themselves. They are applicable in the same cases in which saline waters are found useful, but, being more stimulant, they are better adapted to cases characterised by great debility. The chief mineral waters belonging to this class are those of Ilkeston in Derbyshire, of Kissingen, Marienbad, Auschowitz, Eger, Pyrmont, Spa, Fachingen, Geilnau, Seltzer, and Homburg, in Germany; of Pougues, Mont d'Or, and Vichy, in France; and the Saratoga Congress Spring in America. The waters of Carlsbad and Ems contain comparatively small quantities of free carbonic acid. The chief acidulous waters of Germany, classed according to the quantity of carbonic acid which they contain, beginning with the richest, are—Geilnau, Pyrmont, Eger, Auschowitz, Spa, Fachingen, Homburg, and Seltzer. The waters of Homburg take the first place among the waters of Germany for combined richness in saline substances and free carbonic acid.

(5.) *Hot Springs.* These waters are useful both as baths and as internal remedies. As baths they have the advantage of containing, like sea-water, but in smaller quantity, certain saline ingredients, which act as gentle stimulants to the surface. Taken internally they possess, according to their strength, the properties of the class of saline waters. The principal waters belonging to this class are those of Matlock, Bristol, Buxton, and Bath, in England; of Carlsbad, Ems, and Wiesbaden, in Germany; of Baden in Switzerland; of Plombières and St. Nectaire in France. Some of these hot springs contain, in addition to saline substances, a certain quantity of free carbonic acid.

1068. In some springs the constituents of the waters are such as to give them a place in more than one class, and to entitle them to compound appellations, such as *saline chalybeates*, named from their combining the constituents and properties of saline and chalybeate springs. At some of the favourite watering-places, both in England and on the Continent, springs belonging to the several classes of mineral waters are to be found. Both Cheltenham and Leamington, for instance, have saline, chalybeate, and sulphureous waters; and Harrogate, in addition to strong and mild sulphur-waters, has its pure and its saline chalybeates.

1069. There is no way in which most of the bad habits already referred to (§ 1049) can be more effectually broken through than by a residence at some of the least frequented of the continental watering-places. Those which are most frequented are often the worst adapted to this end, as they combine the luxuries and temptations of large towns with the absence of those natural beauties which offer so wholesome an inducement to pedestrian and other exercises.

THE PRESERVATION OF HEALTH AND PREVENTION OF DISEASE AMONG BODIES OF MEN.

1070. The saddest pages in the history of all nations are those which treat of the wholesale sacrifice of human life through ignorance or neglect of the simplest means of preserving health and averting disease. Such sacrifice of life has occurred in lying-in hospitals from mere insufficiency of space and neglect of ventilation; in foundling hospitals from the same causes, combined with absence of the mother's care and want of the infant's proper nourishment; in schools from want of space, neglect of cleanliness, and insufficient and improper food; in workhouses and prisons from the same causes, added to idleness, listlessness, and depression; in civil hospitals chiefly through want of space; in military hospitals from the same cause, added to the want of proper medical attention and nursing, and sometimes of proper food and medicine; in emigrant and transport ships, and men-of-war, from narrow space, foul air, bad water, and bad provisions; in armies in the field from ill-chosen encampments, bad provisions, overcrowding, neglect of cleanliness, and intemperance. Convulsions, infantile tetanus, and gangrene of the mouth; marasmus; puerperal fever; Asiatic

cholera; jail fever; typhus, 'parish infection,' and the sickness of the house; scurvy; diarrhœa and dysentery; ophthalmia; malignant ulcer and hospital gangrene,—have all been traced to such causes, while all epidemic maladies, small-pox, plague, sweating sickness, black death, and cholera, have in their turn committed their greatest ravages among men, women, and children crowded together, and wanting in one or more of the simple requisites of pure air, good water, cleanliness, due shelter, efficient drainage, appropriate clothing, and wholesome and suitable food.

1071. It is no disparagement to the art of healing to say that more lives have been, and still are, sacrificed to a neglect of the simplest means of preserving health than can have been saved by the most skilful medical and surgical treatment. It is of the first importance, therefore, that the physician should be prepared to understand and recommend with authority the measures to be adopted in order to preserve the health of men, women, and children when of necessity congregated in large numbers. The precautions to be adopted might, indeed, be inferred from what has already been said in this chapter on diet, exercise, clothing, condition of dwelling, place of residence, and habits of life, and, in the earlier chapters of this work, on the causes of disease; but the precepts thus laid down for individuals require to be somewhat modified to meet the cases of men, women, and children in the aggregate.

1072. Of foundling hospitals, for the reception of very young infants, it is not necessary to say more than that they are as indefensible on physical as on moral grounds, and that it would be a waste of time to point out the means of reducing the mortality to which they must be subject. The same observation applies, though not with equal force, to lying-in hospitals. The danger of congregating large numbers of puerperal women within their walls is obvious, and can only be averted by a largeness of space and freedom of ventilation to which the expense must always be a serious obstacle.

1073. In speaking of schools, it will be sufficient to remark that the number of contagious maladies to which children are subject renders an observance of all the rules of health presently to be laid down for adults doubly necessary.

1074. To prisons, in a sanitary point of view, attaches the necessary drawback of confinement at a time of life when the desire for active employment is at its height. The inmates of workhouses must share this evil with prisoners; and it cannot admit of doubt that when, to the evils of confinement in the case of the healthy, are added those of sick-wards with inadequate accommodation, limited space, and a scale of expense adapted, of necessity, rather to the means of the poorer rate-payers than to the strict necessities of the case, workhouses have always been, and must continue to be, highly destructive of human life. The means to be employed for securing the health of their inmates do not differ from those presently to be enumerated.

1075. Sailors and persons on board ship, and soldiers on service, are exposed to special disadvantages; sailors to unusual narrowness of space, often combined with bad water and scanty and unwholesome food, and to great exposure and fatigue; soldiers to the same evils in nearly the same degree, with the superadded disadvantage of equal exposure to the weather with less shelter, encampment on unhealthy spots, and more permanent occupation of badly-selected sites for barracks and hospitals.

1076. In treating of the means of preserving health and preventing disease among bodies of men there will have to be considered: 1. The case of persons confined within such buildings as prisons, workhouses, and barracks. 2. The case of the sick in hospitals. 3. The special case of persons living for a time on board ship, as sailors and emigrants. 4. The case of sailors and of soldiers in actual warfare.

1077. 1. The means of preserving the health of persons confined within such buildings as prisons and workhouses are those already described in the beginning of this chapter as applicable to individuals and families, with a few obvious modifications. The buildings themselves should be so constructed as to combine a healthy site and suitable aspect with good water supply, thorough drainage, spacious living and sleeping rooms, facilities for oversight and inspection, and ground for exercise and wholesome labour. The portions of the structure requiring drainage should be placed on the skirts of the building in such a manner as to obviate the necessity of carrying the drains under the building itself; the walls should be surrounded by air-drains; the lower story of the building should be so constructed that the floor should not be in contact with the soil; the purity of the air should be provided for by a space in living and sleeping rooms not falling short of 1,000 cubic feet, and warmth and ventilation conjointly by open fireplaces, and windows glazed with thick glass, or with double panes of common glass, opening above and below. In prisons warming by hot air, hot water, or steam, and ventilation by mechanical aids are perhaps necessary. In all other buildings these modes of warming and ventilating are highly objectionable, except, perhaps, for passages and halls. In this class of buildings scrupulous cleanliness is to be insisted on, not merely for its own sake, but for the occupation it affords; facilities for exercise have not merely to be afforded, but exercise itself to be organised and superintended; and the greatest care should be taken that the diet of the inmates consists of a due proportion of animal and vegetable substances, from which vegetables or cheap fruits containing a vegetable acid, or such an acid in combination with an alkali, should on no account be omitted. This precaution requires to be especially borne in mind when the potato, which answers this description, falls short.

1078. 2. Hospitals, in common with buildings destined to the reception of bodies of healthy persons, ought to combine a well-selected site, a dry soil, thorough drainage, a suitable aspect, a compact arrangement of rooms and passages favourable to efficient oversight and easy

communication, and an economic system of warming and ventilation. The remarks already made on site, soil, and drainage, as applicable to houses, apply equally to hospitals, and a few additional words on the subject of aspect will supply all that is required on this head. The best aspects for the wards of an hospital are east and west, or south-east and north-west; for dispensaries and rooms used for the examination of patients north and south; for larders and provision stores north. A compact arrangement of rooms and passages is best obtained in a lofty building with a large central staircase; and the most economical as well as least objectionable arrangement for warming and ventilating is obtained by a combination of open fire-places with the thick walls of a lofty building, and windows glazed with thick glass, or with double panes of thin glass, and opening freely above and below. The air of the great central staircase should be warmed by open fires, and be available in bad weather for the ventilation of the wards.

As the wards of an hospital are occupied by sick persons day and night, the cubic contents per bed should be at least half as great again as in prisons, workhouses, and barracks. It should not fall short of 1,500 cubic feet; and in fever hospitals and lying-in wards should amount to 2,000 cubic feet. Each of the beds arranged along the outer walls should stand in a pier between two windows, and ample space for access should be left on both sides of every bed.

The same principles of arrangement and construction apply to military as to civil hospitals. Of camp hospitals, or of buildings used for soldiers in actual service, it may suffice to observe that the roughest weatherproof shed, provided it be spacious, is to be preferred to the most substantial building if overcrowded. This truth was distinctly proved by Dr. Brocklesby, and it is one which should never be absent from the mind of the army surgeon.

1079. 3. A ship on the open sea has the solitary advantage of being surrounded by a pure air free from any injurious terrestrial emanations. In all other respects it is placed under unfavourable circumstances. It combines the drawbacks of inadequate space for the accommodation of passengers and crew and the stowage of water and provisions; of ventilation liable to frequent interruptions; of a moist atmosphere acting on vegetable matters subject to decomposition; and of the frequent incursions of a water abounding in salts (the sulphates), which by their decomposition permit the evolution of sulphuretted hydrogen gas. A ship in harbour, though in other respects placed under more advantageous circumstances, is often exposed to the most deleterious emanations from low swampy lands and rich alluvial soils. A seafaring life, moreover, is exposed to great and continuous fatigues under circumstances otherwise unfavourable to health, and, to a certain extent, and often for long periods of time, to the evils of a monotonous existence. Hence the preservation of the health of seamen and passengers by sea is only to be accomplished by the most watchful care and attention to the cleanliness, dryness, and ventilation of the ship, the supply of the crew with fresh water, and sound provisions embracing

all the elements of a wholesome diet, with suitable clothes, and proper change of clothing, and with fitting exercise, occupation, and recreation.

The means to be adopted to insure these ends can only be fitly described by those who add to a general knowledge of the principles of hygiène a special acquaintance with the construction and internal economy of ships. The obvious desiderata are spacious cabins and berths, a dry and pure atmosphere, efficient ventilation, pure water, sound provisions embracing the necessary element of vegetables, fruits, or the juices of fruits, or fermented liquors obtained from vegetable substances, proper clothing, varying with the climate, with due change of clothing, the separation of the sick from the healthy, and facilities for bodily exercise and mental recreation.

1080. 4. The preservation of the health of soldiers and sailors in actual warfare is a subject which can only be treated adequately in works specially devoted to it. Men engaged in offensive wars are exposed at the same time, or in quick succession, to every cause of disease except inactivity of mind and body; and even from this they are not always exempt. They are often called upon to serve in unhealthy climates and pestilential places, in the most inclement seasons, with inadequate shelter, or with no shelter at all, with short supplies of provisions, rarely of the best quality, and from which some important elements of a wholesome diet are almost necessarily omitted, exposed to every species of hardship and privation, to fatigue and want of rest, and they are sometimes tempted to dangerous excesses of riot and intemperance. When serving at a distance from home, they must often enter on a campaign with their health impaired by the confinement of a long sea voyage, and must often remain in garrisons and encampments combining the most unwholesome sites with the most imperfect sanitary arrangements. Being necessarily placed under such disadvantageous circumstances, a close attention to all the known means of preserving health and preventing disease becomes imperatively necessary. Some of the leading precautions and provisions applicable to the soldier in service may be briefly stated.

In transporting troops from place to place the same watchful care is required on board ship as in the case of sailors and passengers; and when it is possible to choose the time of the year, that should be selected which will enable the soldier to arrive at his destination at the healthiest season, and one bearing the nearest resemblance to the climate of his own country. His *clothing* should be suited to the climate and season, being of close fitting woollen materials in cold climates, and in winter; of cotton, setting loose, and with protection for the head, in hot climates and in summer. In winter, flannel should be worn next the skin, in summer, cotton. A warm, waterproof cloak, for wet weather and night use, and strong thick shoes well fitted to the feet, with thick woollen socks, complete the necessary clothing of the soldier. In all places, and at all times, mere soldierly appearance and bearing should give place to comfort and practical efficiency. The *best bedding* for the soldier is a mattress stuffed with cork, covered

beneath with waterproof cloth, and having a double flap of the same material to draw over the body. The soldier's *diet* should be as carefully adapted to the climate as his dress. In cold climates a maximum of animal food should be provided, and spirituous liquors are least injurious; in warm climates an excess of vegetable food, and an abstinence from spirituous liquors should be enjoined; in both, vegetables and ripe fruits, or their nearest substitutes, should on no account be omitted. The soldier on the *march* should be in motion during the hours most suitable for exercise, and for avoiding the intense heat of warm climates. He might always advantageously walk three or four miles before taking his first meal; then, after rest and refreshment, enter on the principal portion of the day's march. The best food for the first meal is warm nutritious soup, or hot coffee with bread; and tea is always a grateful refreshment. The ground chosen for *encampments* should, if possible, be sloping, so as to allow of natural drainage, protected from cold winds, and, in hot climates, affording the shelter of trees. Places for the deposit of offensive matters should be chosen in reference to the prevailing direction of the wind. Soldiers should not remain on the same spot for any length of time, but the site of the camp should be changed at short intervals. Proper arrangements should always be made for separating the sick from the healthy; and, in providing tents, or huts, or more substantial buildings for hospitals, the principle already laid down should be constantly borne in mind, that the very roughest shelter, with plenty of space, is preferable to the most substantial building without it.

Soldiers in *cantonments or barracks* often suffer severely, and are subject to a frightful mortality, in consequence of the selection of an improper site. Instead of being stationed on high sloping ground, some low-lying swamp at the mouth of a river is chosen, with the certain result of excessive sickness and a high mortality. If to this first fatal error there be added a similar neglect of other hygiènic precautions, the results are most lamentable. If, on the other hand, a good choice of a site is followed up by careful attention to all the simple rules of health, the life of the soldier may be preserved even in the most unhealthy climates.

In cantonments and barracks, and on the march as far as the exigencies of actual warfare will permit, the following precautions should be carefully observed. The soldier should be sheltered, as much as possible, from the heat of the day, and from the cold and dews of the night; dry, healthy spots should be chosen for military exercises; military duties should be so timed that the soldier may be deprived as rarely as possible of his natural sleep; in mounting guard, arrangements should be made to employ as few fatigue-parties as possible; the messes should be so ordered that the soldier may begin the duties of the day with a comfortable, warm breakfast, the diet should always comprise a due supply of vegetables and ripe fruits, and the canteen should be placed under stringent regulations; the means of personal cleanliness should be provided, and daily washing of the feet and frequent bathing be insisted on; flannel waistcoats or cotton shirts should

be worn next the skin, and a flannel belt round the loins; and a change of clothing should be provided and ordered after every exposure to rain. The soldier should also be subject to frequent medical inspection, especially during the prevalence of epidemics, and he should be encouraged to engage in manly sports, should be employed to the utmost in useful and cheerful labours, and in mental occupations calculated to occupy and amuse the mind.

6. CLASSIFICATION OF REMEDIES.

1081. The principal classes of remedies, with the more important substances contained in each class, have already been incidentally mentioned in the previous sections of this chapter. The following summary, which embodies these points of information, will be found of use, and in accordance with the design of a book of reference.

1082. CLASS I. STIMULANTS.—(*a*) *general*, (*b*) *local*. *General stimulants* excite all the organs and functions of the body: they quicken the circulation, increase the activity of the brain and nervous system, and promote the flow of the secretions. In healthy persons they cause a frequent, full, and quick pulse; in extreme debility, they render the pulse less frequent, but more full. The exhaustion which follows the excessive use of them resembles the effects either of the depressants or of the narcotics.

1083. *Local stimulants* act on one or more of the organs of the body, either directly or through the circulation. They excite those organs to the active performance of their appropriate functions, and this excitement is generally accompanied by increased determination of blood. The reaction which follows their abuse shows itself in sluggish function and circulation. In local debility they act as local tonics.

1084. The *general* stimulants in most common use as medicines are the *diffusible* stimulants, with their various forms and preparations, alcohol, ether, and ammonia; also turpentine, creasote, phosphorus, cold employed as a shock, heat, and electricity. Amongst the stimulant remedies of less power, are some of those which are commonly designated antispasmodics, as valerian, assafœtida, musk, castor, camphor, &c. To these may be added, senega, serpentary, and contrayerva, which appear to combine the virtues of a stimulant and tonic, and are employed with advantage in typhus fever.

1085. There are certain remedies also which may be referred to the class of general stimulants, as they are administered by the mouth, enter the circulation, and affect particular systems and tissues. To this class belong nux vomica, and the active principles strychnia and brucia, which affect the muscular system by producing tetanic spasms; the metallic preparations, especially mercury, arsenic, and antimony, which appear to act upon the entire capillary system, including the capillaries of the secreting organs; and the balsams, which affect the mucous membranes.

1086. The *local* stimulants comprise those which are applied directly

to the body, as heat, the escharotics, and rubefacients, applied to the skin; the stomachics, carminatives, and emetics, taken into the stomach; the several classes of purgatives, applied to the mucous membrane of the bowels; and those which, after entering the circulation, act only on certain organs, as the sudorifics, the diuretics, the emmenagogues, &c.; and the stimulating remedies so advantageously employed in diseases of the urinary passages—viz., copaiba, cubebs, and pepper. Some of these remedies have a specific action upon one part of the frame, as the ergot of rye, which stimulates the muscular fibres of the uterus; while others have a more extensive range of action, but affect some one organ in a marked degree, as cantharides, which acts most strongly on the muscular coat and mucous membrane of the bladder.

1087. CLASS II. TONICS.—(*a*) *general*, (*b*) *local*. These are remedies which produce little or no direct sensible effect on the circulation, nor on the more obvious functions of the brain and nervous system. Their action is gradual, and consists, as the term implies, in giving tone and firmness to all the textures of the frame, by improving the state of the blood, or by increasing the contractility of the capillaries of every part of the body.

1088. *General tonics* are either strong stimulants given in small doses, or weak stimulants in larger ones. As they are administered in states of debility, the characteristic effect of the stimulant on the circulation is not perceptible.

1089. *Local tonics* are those remedies which restore the relaxed capillaries of parts to which they are applied to their healthy condition. These, too, are stimulants applied with caution, and of strength proportioned to the condition of the parts affected.

1090. The principal *general* tonics are the stronger metallic preparations in small doses, or the less active, as zinc and steel, in larger quantities; the mineral acids; and a variety of vegetables and vegetable alkaloids. Among the alkaloids may be mentioned quina and cinchonia, narcotine, and salicine; and among vegetables, cinchona, cascarilla, cusparia, calumba, chamomile, gentian, quassia, and wormwood. The hop combines a tonic and narcotic property, and myrrh is both tonic and astringent. To these must be added, cold applied repeatedly in the form of shock, and followed by reaction. The *local* tonics are, nitrate of silver and sulphate of copper, and cold in the form of *douche*.

1091. CLASS III. DEPRESSANTS.—The action of depressants is the reverse of that of stimulants. They prostrate the powers and functions of the entire frame. They increase the frequency, but diminish the fulness and force of the heart's contractions, except where they remove an existing disease accompanied by a frequent, full, and hard pulse: in this case they render the pulse less frequent, smaller, and softer.

1092. The best depressant which we possess, next to blood-letting, is tartar-emetic. Tobacco and the lobelia inflata belong to the same class; but they have not a pure depressant action. Digitalis, ipecacuanha, squill, and colchicum also possess this quality in a high degree, but with certain peculiarities of action; and aconite possesses very remarkable depressant properties, combined with powerful sedative virtues.

1093. CLASS IV. SEDATIVES.—(*a*) *general*, (*b*) *local*. This class comprises those remedies which soothe excitement of the nervous system, without producing a state approaching to syncope on the one hand, or that of narcotism on the other. They bear to depressants nearly the same relation that tonics do to stimulants. Local sedatives are remedies which blunt nervous sensibility, soothe pain, and allay spasmodic action of the muscular fibres.

1094. Among *general* sedatives, cold is the most important. Belladonna, conium, and stramonium, are of the same class. The same substances locally applied are *local* sedatives. Nitrate of potash, nitrate of bismuth, and the preparations of lead, belong also to this class of *local* sedatives. Depressants in small doses become sedatives, as stimulants in small doses are tonics.

1095. CLASS V.—NARCOTICS. — The property of this class is to produce sleep, and, when given in poisonous doses, coma and apoplexy. Morphia is the type of this class, to which belong carbonic acid, carbonic oxide, and sulphuretted hydrogen gases, hyoscyamus, lactucarium, camphor, and hydrocyanic acid. Opium and nutmeg combine a narcotic and stimulant property, whilst the hop is a narcotic and tonic.

1096. In addition to the foregoing classes of remedies, there are other groups of less importance which require only a cursory mention: such are the emollients, the antacids, the antilithics, the anthelmintics, &c. The nature and mode of operation of the substances included in these groups are sufficiently obvious.

1097. The foregoing classification has no pretensions to minute scientific accuracy. It is, indeed, extremely difficult to frame any satisfactory scientific classification in the present state of our knowledge; but the reader who may desire more extensive information on this subject, will find an ingenious and not unsuccessful attempt at a scientific classification in Dr. Headland's excellent Prize Essay on the action of medicines.

1098. For a more detailed account of the substances and pharmacopœial preparations belonging to the several classes just enumerated, the reader is referred to the collection of Formulæ at the end of the second part.

PART II.

PRACTICE OF MEDICINE.*

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GENERAL DISEASES.

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SPECIAL DISEASES.

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7. Diseases of the organs of sense.
8. Diseases of the skin and its appendages.
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* In the earlier editions of this work, Cullen's Nosology was followed; in subsequent ones, that order of arrangement has been adopted which seems most likely to be useful in a practical work. It is not founded upon hypothetical principles, but is intended to bring together those subjects which have the most obvious connection with each other.

GENERAL DISEASES.

CHAPTER I.

STATES OF SYSTEM.

PLETHORA	The Plethoric State.
ANÆMIA	The Anæmic State.
CACHEXIA	The Cachectic State.
MIMOSIS INQUIETA	The Nervous State.
FEBRICULA	The Febrile State.

THE subjects treated in this chapter have peculiarities which entitle them to a place by themselves. They are rather disordered states of system than diseases properly so called. They consist in a departure from health, more or less permanent, not necessarily complicated with any local affection, and often present and cognisable in combination with specific and well-defined maladies. A plethoric, an anæmic, or a cachectic patient, or one suffering from extreme debility, or from a group of nervous symptoms, may become the subject of one and the same disease, such as typhus fever or small-pox, which disease will be materially influenced in its character, progress, and termination by that pre-existent *state of system*. The treatment also which it may be proper to adopt, with a view to the cure or relief of the patient, will be materially influenced, and in some cases altogether determined, by the state of system on which his disease has supervened. Again, in all those diseases in which the indications of treatment are obscure, or the appropriate remedy not yet discovered, the only course open to the physician is to direct his prescriptions to the state of system. Nor are these states of system unimportant in themselves; for not only are some of the symptoms which characterise them very painful and distressing, but they are apt to be confounded with the symptoms of diseases requiring very different, and, generally speaking, much more active treatment. Nor ought it to be forgotten that these states of system may be themselves brought on by several analogous local or general causes, and that to recognise the state of system is to possess a clue to the often obscure, and little suspected, origin of the existing *disorder*. This observation applies with peculiar force to the three

states of anæmia, cachexia, and mimosis inquieta. For these reasons the contents of this chapter are placed by themselves, and take precedence of diseases properly so called.

PLETHORA—THE PLETHORIC STATE.

SYNONYMS.—General Hyperæmia.—Polyæmia.—Fulness of blood.—A full habit of body.

DEFINITION.—A state of system characterised by an excessive quantity of blood, or by an excess of its more solid constituents.

VARIETIES.—Plethora may exist in various degrees of intensity, from that slight degree known as a full habit of body, up to that more intense form in which the circulation is oppressed, and the functions directly connected with it seriously deranged.

SYMPTOMS.—The general aspect of the body full and florid; the capillaries of the surface injected; the redness of the skin momentarily removed by pressure; the lips red; the eyes bright, and the conjunctiva injected; the tongue clean and red, or slightly furred; the appetite generally good; the bowels usually confined; the skin dry, but perspiring profusely on exertion; the pulse frequent, full, firm, and bounding. In the more strongly-marked cases, the pulse is infrequent, indistinct, and labouring, or irregular in force and frequency, according to the degree in which the heart is oppressed; the extremities are cold; the patient is weak, listless, and easily fatigued, and suffers from palpitation and shortness of breath, and frequent sighing on exertion; and complains of giddiness, noises in the ear, light or dark spots before the eyes, and a dull, heavy pain in the head.

COMPLICATIONS.—Suppression of the menstrual discharge in young females. Hysteria. The symptoms of mimosis inquieta (p. 288), at or about the change of life. Hæmorrhoids in both sexes.

TERMINATIONS.—In local congestions, inflammations, and hæmorrhages; in apoplexy, especially in persons with large chests and short necks; in hypertrophy of the heart; in gout.

PATHOLOGY.—This disorder consists in an excessive quantity of blood; or, the quantity remaining unchanged, in a superabundance of red particles and fibrin.

CAUSES.—*Predisposing:* A peculiar habit of body, with large chest and short neck. *Exciting:* A highly nutritious diet; beer and spirituous liquors; sedentary habits; too much sleep; inadequate exercise, with free exposure to the air.

DIAGNOSIS.—This state is easily recognised by the fulness of the whole capillary system, and the rapid filling of the vessels of the surface on the removal of pressure.

PROGNOSIS.—Favourable; but this state of system, though admitting of improvement, can rarely be altogether removed.

TREATMENT.—*Indication:* To lessen the quantity of blood, or lower the proportion of red particles and fibrin.

In the common run of cases this indication is best fulfilled by a spare diet, abstinence from malt and spirituous liquors, early rising, regular exercise, and the frequent use of saline aperients. (℞ Magnesiæ sulphatis, ℥i., magnesiæ carbonatis, ʒi., aquæ menthæ piperitæ, aquæ āā f. ℥iv. M.) Two or three tablespoonfuls of this mixture may be taken three times a-day; or the compound colocynth pill may be given every night, followed by a wine-glassful of the mixture every morning.

In extreme cases, and where there is a threatening of local disease, bleeding from the arm should be practised in addition to the treatment just prescribed. The quantity of blood abstracted must depend on the effect produced and the relief afforded. As a general rule, small bleedings are to be preferred; but in some cases the system will bear the removal of forty or fifty ounces, or more. The blood should be taken from a small orifice, in the semi-erect or recumbent posture, and the pulse should be examined to ascertain the effect produced. When it is frequent, full, and bounding, blood may be drawn till it falls to its natural frequency and force; if labouring, till it becomes full and free; if irregular, till it becomes regular. But, as a general rule, it is better to avoid the letting of blood, and to trust to the prolonged use of abstinence, exercise, early rising, and saline aperients.

PROPHYLAXIS.—To prevent the rapid formation of fresh blood, a diet consisting chiefly of vegetables, with small quantities of animal food, and total abstinence from malt or spirituous liquors, must be enjoined; and the bowels must be freely kept open by suitable aperients.

TREATMENT OF COMPLICATIONS.—In females suffering from amenorrhœa, blood may be taken from the groin by from four to six, or more, leeches applied at the menstrual periods. If there is much acidity at stomach, with flatulence and heartburn, scruple or half-drachm doses of carbonate of soda, or bicarbonate of potash, may be given with advantage. If symptoms threatening apoplexy, hypertrophy, or gout, are present, the treatment must be modified in accordance with the pathology of those diseases.

ANÆMIA.—THE ANÆMIC STATE.

DEFINITION.—A state of system characterised by a diminished quantity of blood, or by a diminution in the quantity of red particles and of its more solid ingredients.

VARIETIES.—1. Acute anæmia, or the effects of loss of blood. 2. Simple chronic anæmia. 3. Cachectic chronic anæmia, or chlorosis.

1. Acute Anæmia.—The Effects of Loss of Blood.

Symptoms.—The most familiar of the effects of loss of blood (or of profuse discharges rapidly poured out) is *syncope*, of which the symptoms are giddiness, followed by loss of consciousness; suspension of respiration alternating with deep sighs; the pulse and beat of the heart scarcely, if at all, perceptible; the surface pale, and bedewed with cold perspiration. Recovery takes place with momentary delirium, yawning, deep sighs, sickness, and a gradual return of colour to the skin, and of pulse to the heart and wrist. This fainting state is followed by reaction, and recurs from time to time on slight exertion, or change of posture; but in fatal cases the symptoms become gradually and progressively worse; the countenance paler and more sunken; the extremities colder and colder; the breathing panting, gasping, or stertorous; the pulse imperceptible; restlessness and jactitation are followed by coma, or convulsions; at length, the patient's strength is exhausted, and he sinks, gasps, and expires.

The state of *reaction* is characterised by peculiar and strongly-marked symptoms: by forcible beating of the carotids, with a sense of throbbing and tension in the head; palpitation of the heart, in the scrobiculus cordis, and in the course of the aorta, and a frequent, bounding, and often irregular sharp pulse; a hurried, panting, sighing respiration; restlessness, jactitation, and mental agitation; intolerance of light and sound; the sleep is disturbed by fearful dreams; the waking is hurried and perplexed. Violent delirium, mania, coma, amaurosis, and deafness are among the concomitants of this state.

The sinking state is characterised by drowsiness, want of recollection, and occasional slight delirium; the breathing is hurried and catching, and interrupted by deep sighs, or by a short cough; the pulse and beat of the heart are fluttering or imperceptible. The pale and sunken countenance, restlessness, jactitation, delirium, cold extremities, loss of power over the sphincters, and involuntary mucous râle, announce the approach of death, which generally takes place amid convulsions. Sometimes, however, the patient expires during some sudden movement, such as sitting up in bed. Recovery from this state of exhaustion is generally slow and tedious.

Post-mortem appearances. — Effusion of serum within the brain; œdema of the lungs; an empty state of the cavities of the heart; increased bronchial secretion; serous effusion into the pleura and peritoneum; general œdema or anasarca; tympanitic distension of the bowels.

Diagnosis.—The pallid state of the skin, lips, and gums points out the state of the circulation.

Treatment.—*Indications.* I. To promote the formation of new blood. II. To economise and support the strength. III. To soothe the existing nervous excitement.

I. The first indication is fulfilled by the administration of nourishing

food and wine at short intervals. In extreme cases brandy must be substituted for wine.

II. The second indication is partly fulfilled by nutritious food and alcoholic stimulants, and partly by the diffusible stimulants, of which ammonia is the best. The recumbent position, with the head low, must be insisted on so long as the extreme debility lasts; and sudden changes of posture must be strictly forbidden.

III. The third indication is met by opium and its preparations, which should be given in combination with the diffussible stimulants mentioned in the second indication. The following may be given three or four times a-day:—

℞ Ammoniæ sesquicarb., gr. v. or gr. x.
Tincturæ opii, ℥x. to ℥xx. or ℥xxx.
Misturæ camphoræ, f. ℥i. or f. ℥ifs. M.

Or Prescriptions 164, 167, 168, 169, 170.

Still larger doses of laudanum, or corresponding full doses of solid opium, are often required to procure sleep in the restlessness attendant on extreme exhaustion; and doses of a drachm of laudanum or 5 grains of opium, may be safely given, and repeated at intervals regulated by the effect, in the violent delirium, or acute mania, of exhaustion following loss of blood, profuse discharges, or privation of food.

The state of *syncope* must be treated by placing the patient in the recumbent posture, with the head low, loosening the dress, sprinkling the face with cold water, applying hartshorn to the nostrils, using friction to the extremities, and administering stimulants, such as brandy and water, or wine, internally. The window of the apartment should also be thrown open.

In the *sinking state*, strong stimulants, such as brandy and water, or pure brandy, must be given in small quantities at short intervals; and, where the cause of the sinking state is not in itself necessarily fatal, artificial respiration, and galvanic shocks passed through the chest, may be resorted to as a last means of restoration.

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2. Simple Chronic Anæmia.

Synonym.—Anæmia.

Definition.—A state of system coming on gradually, continuing generally for some weeks or months, and dependent on a decrease in the red particles and solid constituents of the blood.

Symptoms.—Universal pallor of the skin, conjunctiva, gums, and lining membrane of the mouth; dead whiteness of the substance of the tongue; cold extremities; debility; fainting fits; palpitation and dyspnœa on the slightest exertion, accompanied by violent pulsation of the carotid arteries; headache, consisting generally in a fixed pain *over the* eyebrows or on the top of the head; pain under the left

breast, or a sense of fulness in the chest; pulse frequent, small, and quick (in extreme cases aptly described as a *jerking* pulse), increased by exertion and emotion. The patient is easily agitated by slight noises or unexpected events, and suffers from depression of spirits, and, in some cases, from hysteric fits; the secretions and excretions are generally scanty, and the bowels often torpid.

PHYSICAL SIGNS.—On applying the stethoscope over the large veins of the neck, in the supra-clavicular space, especially on the right side, a humming sound (the *bruit de diable*, or humming-top sound) is heard. In extreme cases, a *bruit de soufflet*, bearing a strong resemblance to the puffing of a locomotive, is heard in the carotid and other large arteries during sudden excitement of the circulation. In the space above the clavicle the venous murmur and the arterial bellows sound are often heard at the same time. These sounds, however, are not peculiar to anæmia, and they are not required as diagnostic marks where the pallor of the surface is well marked.

COMPLICATIONS.—It is often, but not always, associated in the female with amenorrhœa, or with scanty menstruation.

CAUSES.—*Predisposing.* The female sex, and the age of puberty, or the period preceding or following it. It is of rare occurrence in males.

Exciting.—In females obscure, but connected with the function of menstruation. In males occasioned by overwork; as in bakers, and other working men following exhausting occupations, without sufficient time for rest and refreshment. For other exciting causes of the allied state Cachexia, see Cachexia.

PROGNOSIS.—Favourable; though the recovery is sometimes slow and tedious.

DIAGNOSIS.—From the effects of loss of blood or other drains upon the system, by the history of the case. From chlorosis, by the absence of disorder in the functions of the alimentary canal.

TREATMENT.—*Indication.* 1. To promote the formation of the red particles of the blood by the use of the preparations of iron. These should be given in full doses. The best preparation is the dried sulphate of iron, and the proper dose in well-marked cases of anæmia, five grains three times a-day. An excellent combination consists of five grains of dried sulphate of iron, with an equal quantity of extract of gentian three times a-day. If the bowels are torpid, the compound aloetic pill may be given every night, or as often as may be required.

Whenever the skin, gums, and tongue are pale, whatever may be the other symptoms present, steel may be safely given in full doses. I have administered it in five-grain doses three times a-day, in a well-marked case of anæmia during the most severe and distressing headache, and with the carotid arteries pulsating violently, not only with safety, but with the most prompt and decided benefit. I know of no remedy upon which such uniform dependence can be placed. I have

administered the dried sulphate of iron, combined with extract of gentian, in ten-grain doses; and an anæmic female, who is in the habit of taking these pills as other persons take stimulants, swallowed on one occasion twelve pills, containing half a drachm of sulphate of iron, in one day. The same preparation, in the same liberal doses, may be given with like advantage in the few cases of anæmia which occur in the male subject. (G.)

For other preparations of iron and their doses, see Prescriptions 196, 197, and 209.

A generous diet, with a moderate allowance of wine, is indicated in cases of anæmia accompanied by marked debility; and exercise in the fresh air, proportioned to the strength of the patient, should be insisted on.

Mercurial preparations should be administered with caution in anæmia, as there is reason to believe that salivation is very readily brought on in this state of the system.

When anæmia is accompanied by amenorrhœa, aloetic aperients, such as the compound aloetic pill of the Pharmacopœia, are indicated in preference to other medicines of the same class.

" 3. Cachectic Chronic Anæmia, or Chlorosis.

Synonym.—Green sickness.

Definition.—A state of system partaking of the characters of anæmia and cachexia; and combining an altered state of the blood with a depraved state of the secretions.

Symptoms.—Heaviness; listlessness; fatigue on the least exertion; palpitations of the heart; throbbing of the carotid arteries; pains in the back, loins, and hips; flatulency and acidity in the stomach and bowels, and the symptoms of dyspepsia.

The appetite is often singularly depraved; and lime, chalk, and other absorbents are sometimes greedily eaten, when the accustomed food is rejected. As the disease advances, the lips lose their colour; the eyes are encircled with a livid areola, the face becomes pale, and assumes a dusky yellowish hue; the feet are affected with œdematous swellings; and there is every indication of want of power and energy in the constitution. The breathing is hurried by the slightest exertion; the pulse is frequent, quick, but small; and the patient is affected with various symptoms of hysteria, with cough, and sometimes with confirmed hectic fever.

Causes.—Those of anæmia and cachexia combined. Amenorrhœa is a general, though not a constant, accompaniment.

Treatment.—That proper to anæmia and cachexia combined. The *indications* are: I. To restore the normal character of the blood. II. To correct the depraved secretions.

I. The first indication is fulfilled by the use of steel in full doses

The combination already recommended (see Simple Chronic Anæmia) of sulphate of iron, with extract of gentian, is perhaps the best and only one that need be used. If the form of mixture be preferred, the more soluble salts of iron may be employed (Prescription 196, or the preparations of iron enumerated under *Tonics*). A nourishing and wholesome diet, regular exercise, and pure air must also be prescribed. Change of air, and the use of any of the chalybeate waters will be found beneficial. (See Part I., p. 267.) Sea-bathing, and the use of the shower-bath may also be recommended.

II. The second indication is fulfilled by gentle aperients of aloes, myrrh, and bitters, combined with any of the mercurial preparations in small doses.

In the common run of cases the pills of steel and gentian may be given twice or thrice daily, and one or two of the compound aloetic, or compound rhubarb, pills every night.

The menstrual discharge may, in most cases, be safely left to itself, but if any urgent symptoms connected with the functions of the uterus be present, they must be treated by the remedies pointed out under amenorrhœa, dysmenorrhœa, &c.

Cachexia—Bad Habit of Body.

Synonym.—Cachexia.

Definition.—An unhealthy state of system, allied to anæmia, and due to some poison gradually introduced into the body, or generated within the body itself, circulating in the blood, giving rise to important changes in its composition.

Varieties.—Syphilitic Cachexia. Alcoholic Cachexia. Marsh Cachexia. Tubercular Cachexia (Tuberculosis). Carcinomatous Cachexia. Cachexia of Large Towns (Cachexia Londinensis). Cachexia of Hot Climates (Cachexia Africana). Leucocythemia. Supra-renal Cachexia (Morbus Addisonii).

Symptoms.—A sallow, dusky, or muddy complexion, often tinged with yellow; a dry and harsh skin; a small, frequent, and compressible pulse; the tongue sometimes clean, moist, and red, sometimes pale, but more commonly furred, or cracked; the appetite capricious, often craving and voracious, with a long train of dyspeptic symptoms; the bowels sometimes costive, and requiring the frequent use of aperients, but more usually loose, with dark, slimy, and offensive alvine discharges; the urine variable in character, but generally high coloured, of a strong odour, and depositing a dark sediment; the perspiration and breath offensive. Enlarged tonsils, aphthæ, and cutaneous eruptions, are frequent concomitants of this state, as are also obscure and wandering pains of the body and limbs.

Terminations.—In organic diseases of internal viscera, especially

the lungs, liver, and kidneys; these diseases being often complicated with ascites or anasarca.

CAUSES.—*Predisposing.* Debility in infancy, and hereditary defect of constitution. *Exciting.* Unwholesome diet; want of proper exercise; intemperance; continued exposure to marsh miasma, to a cold, damp atmosphere, or to unhealthy climates; the impure air of crowded cities; the gradual operation of mineral poisons, such as mercury, lead, copper, and arsenic; and of animal poisons, such as the syphilitic virus.

DIAGNOSIS.—From simple *anæmia* by the sallow, dusky, or muddy complexion, as distinguished from the clear and pale skin; by the strongly-marked dyspeptic symptoms; and by the depraved character of the secretions and excretions.

PROGNOSIS.—Favourable if the patient can be removed from the influence of the ascertained cause, and in the absence of organic disease. In other cases, severe visceral disease, as a more or less remote consequence.

TREATMENT.—*Indications.* I. To remove the exciting cause. II. To improve the condition of the circulating fluid.

I. The exciting cause may be removed in the several cases specified by proper diet, exercise, change of air, ventilation of apartments in which unhealthy occupations are carried on, change from unwholesome employments to healthy occupations, or, in the case of syphilitic cachexy, by inducing a new action in the system by preparations of mercury, or by the iodide of potassium.

II. The condition of the circulating fluid may be improved by proper diet, consisting of a due mixture of animal and vegetable food, with a proper proportion of acescent fruits and vegetables; decoctions of herbs, combining a mucilaginous with a tonic principle, as the decoction of sarsaparilla; due attention to all the secretions; and the administration of preparations of mercury, in alterative doses. Of these, the best is Plummer's pill, which may be given in doses of three, four, or five grains, three times a-day, with the decoction of sarsaparilla. The iodide of potassium, or of iron, may be substituted in many cases for the preparations of mercury. The proper action of the bowels should be secured by gentle aperients frequently repeated, and the skin should be kept constantly clean by daily ablution in the morning, or by the occasional use of the warm-bath. The shower-bath may also be used with advantage. Change of air and of scene, and a course of mineral waters, especially the chalybeates, may be resorted to with the greatest benefit, or a course of saline waters may be followed by a course of chalybeates. In the intemperate, the gradual diminution and ultimate abandonment of the use of spirituous liquors must be insisted on.

Of the varieties of cachexia specified above, some will be found sufficiently described under the diseases in which they result: others, as

leucocythemia, the cachexia of hot climates, and supra-renal cachexia, may be briefly described with advantage.

LEUCOCYTHÆMIA (from λευκος, white, κυτος, cell, and αἷμα, blood), or LEUKÆMIA, is a form of cachemia, or of anæmia, for a knowledge of which we are indebted to Dr. Bennett of Edinburgh. The disease derives its name from the excess of white corpuscles existing in the blood. It is characterised by great pallor of surface, accompanied in some cases by œdema, or by dropsical effusions of greater or less extent. The functions of the stomach and bowels are generally deranged, and jaundice is sometimes present. There is great weakness and emaciation, shortness of breath, and, in cases of long standing, hectic fever. The blood is found to contain white corpuscles in great excess. The disease is generally one of adult life, and is commonly associated with disease of the abdominal viscera, especially of the spleen, which is often greatly enlarged, and less frequently of the liver. Disease of the lymphatic glands is also a common accompaniment. The disease is essentially chronic, and the prognosis unfavourable, except in those rare cases in which the viscera are not seriously affected. The cause of the disease is sometimes to be found in severe attacks of the remittent or intermittent fevers of hot climates, leaving behind them disease of the liver and spleen. The treatment will consist in the simultaneous use of preparations of iron, and of the remedies indicated for the concomitant visceral disease.

CACHEXIA OF HOT CLIMATES.—This condition, which is sometimes described as anæmia, is of common occurrence in Europeans resident in hot climates: sometimes as the consequence of organic disease of the abdominal viscera brought on by previous attacks of intermittent or remittent fever; sometimes as the result of a prolonged residence in unhealthy localities without any precedent organic malady; sometimes, again, as the sequel of febrile attacks which have not been followed by organic mischief. It may also be induced by the injudicious use of the lancet, or by attacks of diarrhœa, cholera, dysentery, or hepatitis. The leading symptoms are, a pale and sallow countenance, a cold and shrivelled skin, a pearly whiteness of the eye, a dilated pupil, a dull and languid expression of feature, a peevish temper, and a despondent state of mind. The belly is generally swollen, and the extremities often œdematous, the digestion weak, the bowels torpid, the tongue pale and coated with a white fur, the pulse feeble, and the respiration easily quickened by exertion. The treatment proper for this state consists in the use of the preparations of iron, with aloetic aperients, if required, and such local treatment as the visceral complications require, with strict attention to all the means of preserving health. A dry and bracing air, mental rest, and suitable bodily exercise must be particularly insisted on. Preparations of mercury are contra-indicated. I have, in one or two instances, seen this state of system following service in hot climates and attacks of intermittent or remittent fever, without, however, any serious disease

of the liver or spleen, speedily and entirely cured by the use of preparations of steel. (G.)

For cases, see 'Anæmia,' in Martin's 'Influence of Tropical Climates on European Constitutions.'

SUPRA-RENAL CACHEXIA.—This disease, also known as *supra-renal melasma*, and (from the name of the physician who first drew attention to it) *Morbus Addisonii*, is a form of cachexia characterised, like leucocythemia, by great pallor of surface, pearly whiteness of the conjunctiva, great languor and debility, loss of appetite, an uneasy feeling at the pit of the stomach, and sometimes vomiting of food, feeble pulse, and some degree of emaciation. This anæmic and cachectic state is accompanied by a peculiar and characteristic dicolouration of the skin over the whole surface of the body, but more particularly on the face and neck and under the eyes, on the penis and scrotum, the armpit and navel, the epigastrium and upper extremities. The skin has a smoky appearance, and presents every shade of colour from amber to a dark chesnut, or even a chocolate colour. It is sometimes blended with spots or patches of morbid whiteness. The discoloration may also affect the inside of the cheeks and the lips, which sometimes have the appearance caused by eating mulberries. The cases in which this discoloration is extensive and strongly marked prove uniformly fatal, and, in the majority of instances, reveal after death a diseased condition of the supra-renal capsules. The disease is sometimes an acute inflammation ending in abscess, sometimes a state of atrophy, sometimes of hypertrophy, sometimes of tubercular or carcinomatous degeneration, sometimes of cretaceous deposits. In some cases no other diseased condition is discoverable after death; but in other instances disease of the liver, spleen, or kidneys has been observed. In some instances, again, an attenuated state of the mucous membrane of the alimentary canal has been found similar to that which exists in death by starvation. (Dr. Aitken.) The precise nature of the disease is still unknown, and the appropriate treatment, in the absence of such necessary knowledge, must be that of other cases of anæmia or cachexia.

MIMOSIS INQUIETA—NERVOUS STATE.

SYMPTOMS.—Frequent flushings of the face, tremblings, palpitations, dyspnœa, pains in the left side, giddiness, faintings, loss of recollection, depression of spirits, anxiety, and timidity, are the familiar symptoms of this state, as it occurs in females. In extreme cases, the patient is startled by the slightest noises, is in a state of constant apprehension of death, or of some great evil about to befall her; or she imagines that she has done something wrong, or is harassed by constant fears that she may be tempted to commit some great crime. The sleep is often disturbed by frightful dreams. Neuralgic pains, with extreme weakness of the hands and forearms, are of very common occurrence, and give rise to an unfounded alarm of paralysis. There

are indigestion and flatulence, and the bowels are frequently costive. In other respects the health does not suffer materially. The patient often wears the appearance of good health, does not lose flesh, and may even be of a full habit of body. Hysterical paroxysms are sometimes superadded to the other symptoms, and the disease occasionally terminates in mania.

In men the symptoms are usually less strongly marked; palpitation, dyspnœa, pain in the left side, depression of spirits, timidity, and disturbed sleep, being the leading symptoms.

CAUSES.—*Predisposing.* The female sex. It is rare in men, though it does occasionally occur. *Exciting.* In the female, excessive discharges, such as hyperlactatio, leucorrhœa, menorrhagia, diarrhœa, and repeated losses of blood; convalescence from severe diseases; change of life, and the suppression of the menstrual discharge in females of middle age. In both sexes, fright, grief, anxiety, overwork, scanty nourishment, or fatigue. In men, excessive study, anxiety, dissipation, onanism, and spermatorrhœa.

DIAGNOSIS.—From hysteria, by the absence of hysteric fits, and of the clavus and globus hystericus. Hysteria in its usual form, may, however, occur with mimosis, and it is not uncommon to consider the symptoms just described as hysterical.

PROGNOSIS.—Favourable, but recovery generally slow and tedious.

TREATMENT.—*Indications.* I. To remove the cause. II. To support the patient's strength. III. To allay the existing nervous irritation.

I. To fulfil the first indication, the treatment must vary with the cause.

II. The second indication requires the use of tonics, a generous diet, fresh air, and exercise.

III. The third indication is fulfilled by the use of sedatives, such as opium, hyoscyamus, and digitalis in combination with tonics.

The following prescription, slightly varied according to circumstances, will be found to be suitable to the great majority of cases. It may be given three or four times a-day.

℞ Acid. sulph. dil., ℥x. or ℥xx.
Tr. opii, ℥v. or tr. hyoscyami, ℥xx.
Tr. digitalis, ℥v. or ℥x.
Infus. quassiæ, ℥i. or ℥ifs.

The acid may be given in its full dose when the disorder is dependent on excessive discharges; quinine may be substituted for the tonic infusion; the compound infusion of roses may be substituted for the acid and tonic infusion; or see Prescriptions 120, 123, 127, and 129.

If the bowels are costive, the compound rhubarb, compound aloetic, or compound colocynth pill may be given in five or ten-grain doses every night, or as often as they are required. These aperients may be

combined with alterative doses of mercurial preparations if such are indicated.

When the symptoms of mimosis inquieta occur in anæmic females, the tinctura ferri sesquichloridi, in doses of from ten to twenty minims, may be substituted for the dilute sulphuric acid.

Where great debility is present, stimulants may be substituted for tonics, as in the following draught, which may be given three times a-day.

℞ Ammoniæ sesquicarb., gr. v.
Tinct. opii, ℥v.
Misturæ camphoræ, f℥i.

Or see Prescriptions 163 to 169.

After great and sudden losses of blood, or after the long continuance of exhausting discharges, the dose of opium may be increased to ten drops, or even more, and the above mixture may be given as often as four times in the day.

Bleeding and depressing remedies are contraindicated.

FEBRICULA—THE FEBRILE STATE.

SYMPTOMS.—Increased heat of surface, increased frequency of pulse, flushed face, slightly-furred tongue, thirst, loss of appetite, restlessness, lassitude, and wandering pains in the head, back, and limbs, constitute the ordinary symptoms of the febrile state. These symptoms are sometimes ushered in by shivering, and generally pass off by perspiration. When due to trivial causes, they are ordinarily of short duration. The more severe and prolonged forms of fever are described under other heads. (See Chapter III.)

CAUSES.—Fatigue; exposure to cold; heated rooms; intemperance in eating or drinking; slight local inflammation.

TREATMENT.—*Indications.* I. To remove the cause. II. To abate the febrile action.

I. If the febrile attack has originated in intemperance in eating or drinking, an emetic should be administered. (See Emetics.)

II. In the common run of cases, the second indication may be fulfilled by administering a common saline aperient. (See Aperients.) Perspiration may be promoted by ten grains of Dover's powder given at bed-time, followed by a saline aperient in the morning.

CHAPTER II.

PHLOGOSIS	Inflammation.
CONGESTIO	Congestion.
HÆMORRHAGIA	Hæmorrhage.
HYDROPS	Dropsy.
ERYSIPELAS	St. Anthony's Fire.

PHLOGOSIS—INFLAMMATION.

Varieties.—1. Acute. 2. Chronic.

1. ACUTE INFLAMMATION.

SYMPTOMS.—These are—(1.) Local. (2.) General or Constitutional.

(1.) *Local symptoms. When external.*—Redness, swelling, heat, and pain. The *redness* arises from the increased quantity of red blood contained in all the vessels of the part; the *swelling* from the same cause, combined with the exudation of serum, albumen, or lymph; the *heat* exceeds that of other superficial parts, but never rises higher than that of the blood; the *pain* is explained by the larger supply of blood to the nerves of the part, combined with the pressure of the surrounding textures upon them. It is accordingly most severe when the surrounding textures are most unyielding, as in whitloe; comparatively slight, or only produced by external pressure, in the lax-mucous membranes.

When internal.—The symptoms of inflammation are pain and disturbance of function. The pain, in parts which can be submitted to pressure, is increased by that pressure, and this forms an important means of diagnosis; and, in the less severe forms of inflammation, pain not existing before is sometimes brought out by pressure. *The disturbance of function* consists, in secreting organs, of increase, alteration, diminution, or total suppression of their appropriate secretion, according to the degree of the inflammation; in other organs, it consists of various degrees of excitement—in the brain, rapid succession of ideas, mental irritation, delirium; in the eye and ear, impatience of light and sound, or false sensations, such as flashes of light, musical notes, &c.; in the lungs, dyspnœa; in the heart, palpitation.

(2.) *General or constitutional symptoms.*—In healthy persons, the group of symptoms commonly known as *Inflammatory Fever*; namely, rigors, succeeded by pain in the head, back, and limbs; lassitude; nausea, and loss of appetite; increased heat of surface; thirst; furred

tongue; frequent, full, hard pulse; dry skin; scanty, and high-coloured urine; and constipation. There is a slight aggravation of the symptoms towards evening, and a slight remission in the morning. The sleep is disturbed, and the patient is somewhat delirious. When blood is drawn it is found cupped and buffed.

In severe and extensive inflammation, or in unhealthy persons, the symptoms are those of *Constitutional Irritation:* namely, extreme anxiety and restlessness; hurried respiration; rigors; a frequent, quick, sharp pulse; low muttering delirium; and, in fatal cases, death by exhaustion.

In the drunkard, the symptoms are those of delirium tremens. (See Delirium Tremens.)

In extremely debilitated subjects, those of hectic fever (see Hectic Fever), or of the typhoid stage of continued fever (see Continued Fever).

TERMINATIONS.—1. Resolution. 2. Increased secretion. 3. Hæmorrhage. 4. Adhesion. 5. Softening. 6. Induration. 7. Suppuration. 8. Gangrene.

CAUSES.—*Predisposing.* Sanguine temperament; full habit of body; general debility; cachectic and febrile states of system. *Exciting.*—1. Mechanical and chemical irritants. 2. Cold and heat. 3. Certain alterations in the condition of the circulating fluid. 4. Morbid poisons circulating in the blood. 5. The excitement of the circulation in fever. 6. Local congestion, from imperfect elimination of effete matters.

CAUSES WHICH MODIFY THE CHARACTER OF INFLAMMATION:—

1. Texture. 2. Condition of System.

1. *Texture.*—The *serous* membranes in acute inflammation take on the adhesive inflammation, very rarely the suppurative; in less degrees of inflammation, they pour out serum or liquid albumen. The *mucous* membranes secrete mucus, pus, and, in rare cases, coagulable lymph, and are prone to suppuration, and not to adhesion of opposed surfaces, as also to softening. Inflammation of the *cellular* tissue causes a secretion of serum, and, in higher degrees of inflammation, of coagulable lymph and pus. Its common termination is by *abscess.* Inflammation of the cellular tissue is called *phlegmonous* inflammation. The *parenchymatous* substance of organs is apt to be softened by acute, and hardened by chronic inflammation; it is also liable to abscess and gangrene. Of the *fibrous* tissues, tendon and ligament are prone to gangrene, cartilage to ulceration. *Osseous* inflammation terminates in gangrene (caries and necrosis). The *skin* resembles the mucous membranes in being prone to suppuration. Diffused redness, pimples, and gangrene are also common terminations of cutaneous inflammation. Vesicles, pustules, and spots of ulceration and gangrene also occur on the skin, and constitute the great variety of skin diseases.

The general, or constitutional symptoms of inflammation also vary

materially with the tissue affected. Thus, in inflammation of the *serous membranes*, there is little heat of surface, little muscular debility, little tendency to delirium, with slight acceleration of pulse; but there is acute pain, great tolerance of loss of blood, an excess of fibrin, and a cupped and buffed appearance in the blood itself. In inflammation of the *mucous membranes*, on the other hand, there is little pain, little tolerance of loss of blood, no increase of fibrin, and the absence of the cupped and buffed appearance. There is, however, an exception to this rule in the case of croup, and of certain rare diseases of the mucous membrane of the lungs and bowels, in which the mucous membrane takes on one characteristic feature of inflammation of the serous membranes, namely, the formation of highly tenacious secretions, known as *false membranes*.

2. *Condition of system.*—The effect of condition of system is well illustrated by the exanthemata. In *measles*, the inflammation which prevails is similar to that produced by a common cold, and, in severe cases, leads to the effusion of coagulable lymph from the larynx and trachea; in *scarlatina*, there is a disposition to ulceration in the mucous membrane of the pharynx and adjoining parts; in *small-pox*, the inflammation leads to gangrene, followed by suppuration around the dead points. Another illustration of the modifications produced by states of system, is afforded by common inflammation of the skin contrasted with erysipelatous inflammation.

It is of the utmost importance that the practitioner should be familiar with the constitutional symptoms which mark the several terminations of inflammation. *Acute adhesive inflammation* is accompanied by a full, strong, hard pulse, or a small wiry pulse, somewhat increased in frequency, little or no heat of skin, little or no headache, vertigo, or delirium, no muscular tremor or debility, slight change in the character of the urine, and great tolerance of bloodletting. *Suppuration* is announced by darting and excruciating pains, by severe, and often by repeated rigor, occurring in some cases almost with the regularity of ague, and followed by heat and sweating—the symptoms, in fact, of hectic fever. *Gangrene* is indicated by a sudden cessation of pain, by collapse of the entire system, pallor, cold clammy sweat, sunken features, sometimes low delirium, sometimes peculiar self-possession. A dry, brown tongue, sordes on the teeth, a small frequent, feeble pulse, and the other symptoms of the typhoid state, often precede the fatal termination of extensive or long-continued inflammations.

TREATMENT.—The remedies employed in the treatment of *acute* inflammation are either general or local. The *general remedies* are bloodletting by venæsection or arteriotomy, the tartrate of antimony, in full doses of a fourth of a grain or more, and the preparations of mercury, especially calomel and blue pill, administered in repeated doses, so as to affect the system; and assisted by the frequent use of strong saline aperients. In internal inflammations, general and local bloodletting, tartrate of antimony, mercury, and counter-irritants

are the remedies most in use. The *local remedies* are local depletion by leeches, cupping, or scarification; division of the part; cold, cataplasms and fomentations, and counter irritants. Inflammation of exposed mucous surfaces is often treated by strong irritants, such as nitrate of silver, which have the effect of promoting the contraction of the dilated vessels. Another effective local remedy is pressure, which has been applied with effect in swelled testicle, and in anthrax.

2. Chronic Inflammation.

Symptoms.—Those of the acute form, but in a less degree of intensity, and running a longer course. The redness is of a more dusky hue; the heat little, if at all, above the natural standard, and the pain very slight, or only produced by pressure. The functions of internal parts which are the seat of chronic inflammation, are generally languidly performed, and the secretions are diminished in quantity. In chronic inflammation of the cellular tissue, serous effusion takes the place of the more varied products of acute inflammation.

Treatment.—In *chronic* inflammation, local remedies alone are employed, the general remedies being used to improve the health, and not for the purpose of removing the inflammatory action. The local remedies most in use are, moderate depletion by leeches or cupping, stimulants, which have the effect of causing the capillaries to contract, and counter-irritants. Of stimulants, the most efficacious are nitrate of silver, applied over and around the inflamed part; tincture of iodine; iodine ointment, &c. The capillaries may also be caused to contract, and chronic effusions may be removed, by the cold douche, or by electric shocks passed through the part affected. In chronic inflammation of the lower extremities, a graduated pressure is also of great service, by supporting the relaxed vessels.

For the theory of inflammation see Part I., p. 68; and for the treatment, p. 248.

CONGESTIO—CONGESTION.

Varieties.—1. Active. 2. Passive.

1. Active Congestion.

Synonyms.—Arterial Congestion. Sthenic Hyperæmia. Active Hyperæmia.

Characters.—Active congestion consists in a local fulness of the small vessels, analogous to that general fulness of the vessels of the entire body which constitutes plethora. This fulness of the small vessels is accompanied by a more rapid flow of blood through them, and is marked by the same florid redness which is present in inflammation. This state of congestion, indeed, is the forerunner of inflammation.

TERMINATIONS.—In inflammation. In active hæmorrhage. In dropsy. In passive congestion.

TREATMENT.—When the congestion threatens to run on into inflammation, the moderate and cautious abstraction of blood from the part by leeches or cupping, a position favourable to the return of blood to the heart, the local application of cold, the use of counter-irritants, and the administration of saline aperients, are indicated.

2. PASSIVE CONGESTION.

SYNONYMS.—Venous congestion. Passive hyperæmia. Asthenic hyperæmia.

CHARACTERS.—An overloaded state of the capillaries and small veins, with a languid circulation of blood through the part, which is of a dusky hue.

TERMINATIONS.—In active congestion, passing on into inflammation. In oppressed and sluggish function of the part affected. In dropsy. In passive hæmorrhages, leading to chronic ulcers in the extremities.

CAUSES.—Mechanical pressure. Constitutional debility. A position unfavourable to the free return of blood to the heart. Cold. Imperfect action of secreting and excreting organs.

TREATMENT.—Mechanical support. Tonics or stimulants, according to the degree of the existing debility. A position favourable to the free return of blood to the heart. In the case of congestion of the mucous membranes, or of congestion or chronic ulceration of the integuments, the local use of stimulant and astringent applications. Friction. The moderate use of aperient medicines, to relieve the general circulation.

HÆMORRHAGIA—HÆMORRHAGE.

VARIETIES.—*General and Local.* Arterial and venous. Active and passive. Vicarious. Traumatic. Congestive.

Hæmorrhage arising in healthy states of system from strong action of the heart, is called *active* hæmorrhage; that which arises from a weakened state of capillaries is called *passive* hæmorrhage; that which arises from congestion might be termed with equal propriety *congestive* hæmorrhage.

1. ACTIVE HÆMORRHAGE.

CHARACTERS.—A sudden or rapid and abundant discharge of vermilion-coloured blood.

CAUSES.—*Predisposing.* Youth and vigour. Plethora. *Exciting.* All excitements of the circulation by violent muscular exertion, the

abuse of spirituous liquors, violent passions and emotions of the mind. The *immediate* cause may be the rupture of a large artery or of an aneurismal sac; active congestion of a mucous surface leading to exudation through the capillary vessels; the laying bare of an artery by ulceration; and severe wounds.

TREATMENT.—The antiphlogistic regimen, as in acute inflammation—abstraction of blood from the arm, nauseating doses of tartar emetic, brisk saline aperients, and low diet. A position unfavourable to the flow of blood towards the seat of the hæmorrhage. Quiet and rest of the part affected. Cool air and cooling drinks. Cold applications. Ice. Styptics. The destruction of the bleeding surface by the use of caustics, strong nitric acid, or the actual cantery. The antiphlogistic portion of the treatment should be omitted in all cases of active hæmorrhage occurring in debilitated constitutions. In these cases, in addition to a proper posture, rest, cool air, and cooling drinks, astringent medicines should be prescribed, such as the mineral acids, especially the sulphuric acid, the preparations of zinc and lead, and vegetable substances containing tannin or gallic acid. In all cases of extreme debility, with great pallor of surface, brought on by excessive hæmorrhage, opium and its preparations in full doses are indicated, either by themselves or in combination with astringent medicines, such as the dilute mineral acids, acetate of lead with excess of acetic acid, or tannin.

2. PASSIVE HÆMORRHAGE.

CHARACTERS.—A slow discharge of dark-coloured blood by exudation from mucous membranes and surfaces in a state of passive congestion.

CAUSES.—*Predisposing.* Debility. Old age. *Exciting.* Passive congestion. Mechanical impediments to the return of blood by the veins.

TREATMENT.—The removal of mechanical obstructions to the flow of blood. A favourable position. Rest. Astringent applications. The internal use of tonics or stimulants according to the existing degree of debility.

HYDROPS—DROPSY.

SYNONYM.—Œdema (applied to accumulations of serum of small extent).

VARIETIES.—General or local. Chronic or passive. Inflammatory or acute. Encysted.

Dropsy consists in an effusion of serum or of serum mixed with flakes of coagulable lymph, or with pus, into the cellular membrane of the extremities, or into cavities lined by serous membranes. *The simplest* forms of dropsy are those which arise from pressure

on the veins, from debility, or from the febrile action attendant upon a common cold. The most common situations of dropsical effusions are the skin of the lower extremities, and the sac of the peritoneum.

Causes of dropsical effusions.—1. Inflammation. 2. Febrile action (as in catarrhal dropsy). 3. Debility. 4. Venous congestion. 5. Organic disease, leading to congestion. 6. Organic diseases, leading to an alteration in the constituent principles of the blood; for instance, disease of the kidney.

DIAGNOSIS.—When external, the presence of dropsy is known by the effect of pressure with the point of the finger. The skin *pits*, and does not recover its shape for some time. When the dropsy is internal it is known by the enlargement of the part affected, the disturbance of functions due to its pressure on surrounding parts or organs, and by the sense of fluctuation when the fluid can be set in motion by a sudden slight blow of the finger (as in ascites) or by a rapid change of position as in hydrothorax, the motion being perceived in the one case by the other hand placed on the opposite side of the abdomen, in the other by the ear applied to the part of the chest against which the wave is made to strike.

PROGNOSIS.—When not dependent on organic disease, generally favourable. When dependent on organic disease of long standing, and great severity, unfavourable.

TREATMENT.—*Indications.* I. To remove the cause. II. To diminish the quantity of the dropsical effusion. III. To relieve urgent symptoms by the discharge of the fluid.

I. In inflammatory dropsy and dropsy dependent on febrile action the remedies for inflammation and fever are indicated; in dropsy dependent on debility, tonics or stimulants according to the degree of the debility; in dropsy dependent on venous congestion, moderate depletion to relieve the vessels, and regulated pressure to afford support; in congestive dropsy dependent on organic disease, medicines directed to relieve the disease, which is the source of the congestion; and in dropsy arising from organic disease leading to an alteration in the constituent principles of the blood, a treatment appropriate to the disease in question.

II. The quantity of the dropsical effusion may be diminished by remedies which increase the secretions from the skin, kidneys, and bowels—by sudorifics, diuretics, and purgatives adapted to the existing state of the patient. Among sudorifics, the salines are to be preferred, such as nitrate of potass, Dover's powder, &c.; among diuretics, the salts of potass or soda, in combination with some of the infusions or decoctions given under the head of diuretics; and among purgatives, the saline aperients, the compound jalap powder in doses of from ℈i. to ʒi., and the extract of elaterium in doses of from gr. ¼ to gr. i. The doses and strength of the several remedies must be regulated by the state of the patient, the sudorifics and diuretics

belonging to the class of depressants being preferred in inflammatory and febrile dropsy, and in comparatively vigorous states of the system; and sudorifics and diuretics belonging to the class of stimulants in states of debility. The saline purgatives will be more appropriate in the latter form of the disease, the more drastic purgatives in the former. Cardiac, hepatic, and renal dropsy also require modifications of treatment, and remedies adapted to the primary disease. (See the Diseases of the Heart, Liver, and Kidney.)

III. When dropsical accumulations are carried to such an extent as to interfere mechanically with the functions of surrounding parts, it may be necessary to resort to operations in order to discharge the fluid,—to puncture with the curved needle, in the case of anasarca threatening to discharge itself by vesication, or ulceration of the skin; in ascites by paracentesis abdominis; in hydrothorax by paracentesis thoracis; in hydrocele by tapping, followed by stimulant injections to effect a radical cure.

The various local dropsies will be treated in the following pages under the heads of *ascites*, *anasarca*, *hydrothorax*, *hydrocephalus*, &c.

The strong analogy which exists between the state of the vessels in acute inflammation, in active hæmorrhage, and in inflammatory dropsy, makes the indications for the treatment of the one to be nearly identical with those for the treatment of all the rest, and the same observation applies to chronic inflammation, passive hæmorrhage, and dropsy from debility. The state of the vessels in congestion, too, is the same, whether they pour out blood or serum. The principles of the treatment are the same in either case.

ERYSIPELAS—ST. ANTHONY'S FIRE.

DEFINITION.—A contagious and infectious malady, epidemic at certain seasons, consisting in an inflammation of the skin, or of the skin and cellular tissue, spreading from a single centre over a greater or less extent of surface, and subsiding, or disappearing in one part as it extends to another.

SPECIES.—1. Idiopathic erysipelas. 2. Traumatic erysipelas.

1. IDIOPATHIC ERYSIPELAS.

SYMPTOMS.—The disease usually sets in with rigors, and other symptoms of pyrexia; with confusion of intellect, and sometimes with delirium or coma. There is nausea, and, in some cases, vomiting; in others diarrhœa; the tongue is moist, and covered with a uniform white fur; and the pulse is frequent, quick, full, and compressible. After a variable interval of a few hours, or of one or two days, a red spot appears upon the skin, from which an efflorescence of a rosy, bright scarlet, or dusky red colour spreads more or less rapidly, being *bounded* by a distinct margin elevated slightly above the level of the

sound skin, and at length occupying a large extent of surface. The colour disappears under the pressure of the finger, but returns when the pressure is removed. There is considerable swelling, and a peculiar acrid heat of the inflamed parts. As the redness extends, it disappears from, or gradually subsides in, the parts first occupied. After a longer or shorter time the efflorescence usually terminates in desquamation of the cuticle, or in the formation of vesicles of a larger or smaller size, containing a yellowish serum or lymph. The fever does not subside when the rash appears, and rarely suffers a marked remission till the eruption has ceased to spread, when, in favourable cases, the patient rapidly regains his appetite and strength. In unfavourable cases, the fever assumes the typhoid character, passes through the several stages, and displays the several symptoms described under 'Continued Fever' (see page 304), and the patient sinks comatose or exhausted from the fifth to the tenth day; rarely so late as the fourteenth or twenty-first.

TERMINATIONS.—1. Resolution (*erysipelas mitior*). 2. Vesication and desquamation of the cuticle. 3. Œdema (*erysipelas œdematodes*). 4. Inflammation of cellular membrane (*erysipelas phlegmonodes*), with consequent suppuration, or gangrene (*erysipelas gangrœnosum*). 5. Metastasis to internal organs, especially to their serous investments. 6. The disease sometimes suddenly leaves one part of the surface, and attacks a distant part (*erysipelas erraticum*). 7. Inflammation of the brain and its membranes. 8. Inflammation and suppuration of the mucous membrane of portions of the intestinal canal.

Parts affected by the disease.—The face is the most common seat of idiopathic erysipelas. It is also of frequent occurrence on the lower extremities. That which follows wounds (traumatic erysipelas) may occur on any part of the body.

Erysipelas of the face (*erysipelas faciei*) is by far the most common form of the disease. It commonly begins on the nose, and thence gradually extends over the entire face, causing great swelling of the nose and eyelids, and, in extreme cases, giving rise to great distortion of the features. Sometimes it descends and spreads over the neck and trunk, but more commonly attacks the scalp. In its passage over the head, the membranes of the brain are often more or less affected, and there is acute headache, accompanied sometimes by delirium of the violent or of the muttering kind, according as the accompanying fever is of the inflammatory or typhoid type; and occasionally terminating in coma. From the head it generally extends down the back, and sometimes affects the membranes of the spinal cord. In severe cases, traces of the affection of the membranes of the brain and spinal cord remain for some time after the recovery of the patient, and are shown by mental excitement, and by numbness and spasmodic twitchings of the extremities. Erysipelas of the head and face is generally accompanied by more or less inflammation and redness of the throat,

and in rare instances it proves fatal by inducing serous effusion into the submucous tissue of the glottis and epiglottis.

CAUSES.—*Predisposing.* A full plethoric habit; constitutional peculiarity; previous affections of the same nature. The adult age: debilitating diseases, such as dropsy, fever, or the febrile exanthemata.

Exciting.—Contagion; cold; excessive heat, or vicissitudes of temperature; exposure to the rays of the sun; abuse of fermented liquors; suppressed evacuations; the presence of irritating matter in the primæ viæ; wounds or local inflammation of the common kind occurring in certain constitutions, in certain seasons, and in places where the disease already exists. It is often epidemic, most prevalent during spring and autumn, and frequently prevails in hospitals, gaols, and other crowded situations. It is also a frequent concomitant of puerperal fever.

DIAGNOSIS.—From scarlatina and rubeola by the entire absence of papulæ, and by the absence (in most cases) of the sore throat of the one, and the catarrhal symptoms of the other. From pemphigus by the extent of the inflammatory redness.

PROGNOSIS.—*Favourable.* The fever purely inflammatory; the eruption of a rosy or bright scarlet colour; not extending over a large surface; no vesications: the febrile symptoms diminishing upon the appearance of the efflorescence; and this, soon after, assuming a yellowish hue, with an abatement of the swelling. The adult age.

Unfavourable.—The fever assuming the typhoid form; the inflammation becoming of a dark rose-colour; its suddenly receding from the surface, and attacking an internal part; its extending over a large surface without leaving the part it originally occupied; livid vesications; weak, rapid, irregular pulse; great prostration of strength; early coming on of coma; the disease being epidemic; the constitution of the patient originally weak, or emaciated by previous illness; the disease being combined with or supervening upon dropsy, jaundice, or other affections originating in organic disease. Infancy and old age.

LAWS OF INFECTION.—The disease spreads both by contact and through the air. It may be inoculated, and it is conveyed by fomites. It may attack the same person several times, and may coexist with other severe diseases. Its infecting distance is at least from twenty to thirty feet: its period of incubation from a few hours to two or three weeks. It is an epidemic malady, and rages in some years with extreme violence.

MORTALITY.—The deaths in the metropolis, in a million of persons living at all ages, vary from 110 to 260, and average 160. The *rate* of mortality among persons attacked varies with the severity of the *epidemic*, from one in three to one in ten; or it is even less.

TREATMENT.—*Indications.* I. To reduce the arterial action, if the fever be of the inflammatory kind.

II. To support the strength of the patient, if it assume the typhoid form.

III. To obviate the tendency to a determination to the head or other important organs.

IV. To subdue inflammation, and promote salutary changes in the part affected.

I. High action, if present, is to be reduced.

(*a*) By *bleeding*.—This operation is, however, to be adopted with the greatest care, for it seldom happens that the fever is purely inflammatory. When, however, the subject is young, in the country, the constitution unimpaired, and the symptomatic fever high, the lancet may be resorted to with advantage; on the other hand, in persons accustomed to the air and living of a large town, and more especially if the constitution has suffered, or is naturally weak, the abstraction of blood is contra-indicated. It will very rarely be required in erysipelas of the face.

(*b*) By mercurial and saline aperients. In robust habits, five grains of calomel and five grains of extract of colocynth, followed by the black dose, may be administered at the outset, and from time to time, if requisite; in other cases from three to five grains of blue pill, with the same quantity of extract of colocynth, followed by a saline aperient, may be substituted for the stronger medicine.

(*c*) By nauseating *diaphoretics:* especially tartarized antimony.

(*d*) By cooling drinks and *diluents:* as acidulated soda-water, lemonade, tamarind-water, and the like.

(*e*) By a milk, or farinaceous diet, confinement to the house, or rest in bed.

In ordinary cases of erysipelas faciei, where the symptoms do not run very high, the following saline aperient may be prescribed, and given two, three, or four times a-day.

℞. Vin. Antim. Pot. Tart. ♏xx. to ʒss.
Magnesiæ Carbonatis, gr. x.
Magnesiæ Sulphatis, ʒi.
Aquæ Cinnamomi, f ℥ss.
Aquæ f ℥i. M. fiat Haustus.

If an aperient is not required, the following may be substituted:—

℞. Vin. Ant. Pot. Tart. ♏xx. to ʒss.
Liq. Ammon. Acetat. f ℥ss.
Aquæ f ℥i. M. f. Haustus.

II. *To support the strength of the patient, if the disease assume the typhoid character,* recourse must be had to the remedies recommended in typhus—viz., stimulants, as wine and ammonia, and to the stronger stimulants in persons previously accustomed to their use. These may be combined with opium, which is often found very serviceable, even when the brain is affected.

When the strength is not greatly impaired, and a tonic treatment is indicated, bark may be given with advantage.

℞. Decoct. Cinchonæ, f ʒvii. or f ʒxi.
Tinct. Cinchonæ, f ʒi.

To be given three or four times a-day.

When a stronger stimulus is needed, we may prescribe the following:—

℞. Ammoniæ sesquicarb. gr. v. vel x.
Tinct. Camphoræ f ℥i.

To be given every three, four, or six hours.

When the patient is very restless, tincture of opium may be combined with the foregoing, in doses of from ♏v. to ♏x. or more. But the effect of the opium should be carefully watched.

The treatment of erysipelas will vary, therefore, according to the type of the fever with which it is attended. If it be inflammatory, which it seldom is, the usual means of diminishing inflammation are to be resorted to. If, on the contrary, it assume the typhoid character, wine and stimulants are to be relied on, followed during convalescence by bark or quinine. If the patient is seen in an early stage, an emetic should be given and followed by a brisk purgative.

In the inhabitants of large towns, and in epidemic seasons, all cases of erysipelas of any degree of severity are best treated by a milk diet, gentle aperients, the liquor ammoniæ acetatis in half-ounce doses three or four times a-day, and a daily allowance of wine of from four to six or eight ounces. Quinine in two-grain doses may be substituted for the liquor ammoniæ acetatis in the most severe cases. The presence of delirium does not contraindicate the use of wine and quinine, if the other symptoms and the general state of the patient indicate their use.

III. In cases of head affection with coma and delirium, much relief will be afforded by the application of sinapisms to the feet, mustard pediluvia, or a blister between the shoulders. Diseases of other internal organs must be treated by the remedies applicable to similar idiopathic diseases, taking into account the patient's strength. When the eruption has disappeared from the surface, and attacked an internal part by *metastasis*, an attempt must be made to restore the inflammation of the skin by the prompt application of strong stimulants, as mustard poultices, acetum cantharidis, or hot water.

IV. The topical applications resorted to by surgeons are various.

1. Warm fomentations, such as a warm decoction of poppy-heads.

2. Cold spirituous applications where the inflammatory action runs high, and they are grateful to the patient.

3. Dry absorbent powders, as starch, meal, chalk, magnesia, and litharge, to defend the part from the air, and to take up any acrimonious fluid that may be oozing out.

In phlegmonous erysipelas, the vessels may be relieved by leeches, by small punctures, or by moderate incisions. When gangrene has *taken* place, deep incisions are necessary, and we must use general and

local stimulants, fermenting poultices, the chlorides of lime or soda, &c. Should suppuration occur, the abscess must be opened as soon as fluctuation is perceptible.

PROPHYLAXIS.—Cleanliness, separation, and, if practicable, isolation. Apartments which have been occupied by erysipelatous patients should be whitewashed and thoroughly cleansed.

REMEDIES.—A strong solution of nitrate of silver applied at a short distance from the margin of the inflamed part, or even over the inflamed surface. Creasote similarly applied. Strong mercurial ointment applied to the inflamed skin. Compression.

2. TRAUMATIC ERYSIPELAS.

In certain seasons, when idiopathic erysipelas is very prevalent, very slight wounds and injuries are apt to be followed by erysipelatous inflammation, and wounds or injuries of a more severe character in persons of unsound constitution, or in the healthy inmates of hospitals or public institutions where the disease already prevails, almost uniformly are subject to this complication. The symptoms due to the supervening erysipelas do not differ in any important particulars from those of idiopathic erysipelas; but in the prognosis and treatment the original injury and the consequent erysipelas will have to be jointly considered. The constitutional treatment will be determined mainly by the existing state of system; but, as a general rule, the patient will be required to be supported by a nourishing diet and stimulants, combined with opium in free doses, if great irritation and restlessness prevail. The antiphlogistic treatment is very rarely indicated; and in the inhabitants of large towns perhaps never. The local treatment, in like manner, will be regulated partly by the condition of the part originally injured and partly by the severity and extent of the erysipelatous inflammation. For the particulars of the local treatment the reader is referred to works on Surgery.

CHAPTER III.

FEBRES—FEVERS.

GENERA.

Continued Fevers.

I. TYPHUS . . . . . Epidemic Continued Fever.
II. FEBRIS EPHEMERA . . Ephemeral Fever.

Intermittent Fever.

FEBRIS INTERMITTENS . . Ague.

Remittent Fevers.

I. FEBRIS REMITTENS . . Marsh Remittent.
II. TYPHUS ICTERODES . . Yellow Fever.

CONTINUED FEVERS.

GENERAL OBSERVATIONS ON CONTINUED FEVERS.

CONTINUED fevers are distinguished from the febrile state, or condition, which attends upon a vast variety of local inflammations and diseases, by the circumstance that continued fevers, properly so called, are at their outset (and often during their entire course), free from local complication; while the febrile state, or condition, attendant upon local causes, coincides with, or follows quickly upon, the signs of local disease.

Continued fevers are distinguished from the febrile exanthemata either by the absence of any eruption on the skin during the whole course of the disease, or, in the case of eruptive continued fever, by the rash appearing at a later period after the first febrile symptoms than in any of the febrile exanthemata, as well as by the peculiar situation, character, and course of the eruption. Continued fevers are further distinguished from each other by their duration and severity, the situation and circumstances in which they occur, and the causes which give rise to them. One class of continued fevers occurs, with cases of well-marked intermittent and remittent fever, in hot climates where such forms of fever are endemic. Such cases of continued fever are known as marsh, paludal, or malarious continued fevers. Another class of continued fevers occurs chiefly in large towns, and in the rural districts of temperate climates, and they owe their *origin* not to local causes, but to contagion, though local causes

strongly predispose to attacks of them, and possibly, in extreme cases, give rise to them *de novo*.

This contagious, or infectious continued fever varies greatly in different epidemics; and even in the same epidemic presents such differences in character as would seem fully to justify the recognition of at least three varieties, viz., typhoid fever, typhus fever, and relapsing fever, of which the last seems to bear the same sort of relation to the common forms of infectious continued fever, as continued fevers occurring contemporaneously with the intermittent and remittent fevers of hot climates do to those more common forms of fever. But these differences between different cases of infectious continued fever are not such as to materially affect the treatment to be adopted; they are, therefore, of little practical moment, and do not seem to justify any departure from the plan adopted in recent editions of this work, of treating continued fever under the single heading of TYPHUS or EPIDEMIC CONTINUED FEVER.

The division of Continued Fever into SYNOCHA, or INFLAMMATORY FEVER; TYPHUS, or NERVOUS or PUTRID FEVER; and SYNOCHUS, or MIXED FEVER; is also discontinued, as having no practical value, and the one epithet TYPHUS, with the single synonym EPIDEMIC CONTINUED FEVER, is alone retained. As, however, the terms Synocha, Synochus, and Typhus, have not yet fallen into disuse, it is deemed expedient to subjoin Cullen's definitions of these forms of fever:—

SYNOCHA.—The heat greatly increased; the pulse frequent, full, and hard; the urine high-coloured; the functions of the sensorium little disturbed.

TYPHUS.—A contagious disease. The heat sometimes little increased; the pulse small, weak, and generally frequent; the character of the urine little changed; the functions of the sensorium greatly disturbed; the strength much reduced.

SYNOCHUS.—A contagious disease. The fever compounded of synocha and typhus; of synocha at the onset, of typhus towards the close.

These distinctions are not without foundation in the nature of things. There is a *synocha*, a *typhus*, and a *synochus*; that is to say, there is a form of continued fever with high action, and a tendency to *acute local inflammations*; a form of fever with low action, and a tendency to *local congestions*; and a form beginning with high, and ending in low, action. But all these forms have been observed in the same city, among the same class of persons, in different epidemics of essentially the same contagious malady. In the same epidemic, too, it would not be difficult to select cases of continued fever belonging to each of the three classes, together with milder cases of short continuance and slight severity, differing little from ephemeral fever.

For the reasons now assigned, the single heading of TYPHUS, or EPIDEMIC CONTINUED FEVER, is retained as sufficient for every practical purpose.

TYPHUS—EPIDEMIC CONTINUED FEVER.

SYNONYMS AND VARIETIES.—If named from its prevailing character—SYNOCHA, or INFLAMMATORY FEVER; TYPHUS, NERVOUS, or PUTRID FEVER; SYNOCHUS, or MIXED FEVER; LOW TYPHOID, ATAXIC, or ADYNAMIC FEVER; RELAPSING FEVER: if after its leading complications in particular epidemics—BILIOUS; MUCOUS; GASTRIC; ENTERIC; GASTRO-ENTERITIC; MUCO-ENTERIC; ENTERO-MESENTERIC; DOTHINENTERITIS; and BRAIN FEVER: if after its most common external character—ERUPTIVE FEVER; PETECHIAL, MACULATED, or SPOTTED FEVER: if after its presumed cause—CONTAGIOUS, or INFECTIOUS FEVER; MARSH, PALUDAL, or MALARIOUS FEVER: if after its duration—FIVE, SEVEN, or TWENTY-ONE DAY FEVER: and when named after the places in which it most commonly prevails—PRISON, GAOL, CAMP, SHIP, and HOSPITAL FEVER, and PARISH INFECTION.

DEFINITION.—A contagious or infectious fever, of several days' or weeks' continuance, without well-marked remissions; accompanied by extreme prostration of strength, great disturbance of all the bodily and mental functions, and a strong tendency to local complications; and characterised, in most instances, at an early period of the fever, by a peculiar eruption on the skin.

SYMPTOMS.—The onset of continued fever is either sudden and well-marked, or gradual and obscure.

In the first case, the disease is generally ushered in by a succession of severe shivering fits, followed by acute pain in the head, aching in the back and limbs, a sense of lassitude and weariness, an unsteady gait, and a disinclination to exertion, whether of mind or body. The surface is cold and pale, the skin contracted, and the pulse either small and weak, or full, quick, and very compressible. The breathing is quickened, and often interrupted by deep sighs. The countenance assumes a dull, anxious, and confused expression, and sometimes closely resembles that of a person in a state of intoxication. The appetite fails: in some cases there is nausea, in others vomiting, in others diarrhœa; and the tongue is covered with a thin white fur.

In the second case, the symptoms are often so obscure that it is not easy to determine whether the patient is suffering from continued fever, or merely from slight disorder of the digestive organs, or a common cold. He has no well-marked rigors, and no severe pains in the head, back, or limbs; but he is pale, languid, weary, and drowsy, disinclined to exertion, and incapable of applying himself to business. His appetite fails; the tongue is covered with a thin white fur, the bowels are either relaxed or obstinately confined, the pulse somewhat increased in frequency; and he passes restless nights, and wakes unrefreshed. This period of uncertainty may last three or four days; and the transition into a state of undoubted fever be so gradual that it may be altogether impossible to fix on any precise time at

which the disease may be said to have been first present. The history of the case, by revealing the fact of an exposure of the patient to the contagion of fever, is often the best aid to a just diagnosis.

This premonitory stage, whether the onset be sudden or gradual, passes more or less rapidly into fully-developed continued fever, marked by pungent heat of skin, frequent pulse, thirst, headache, throbbing of the temples, flushing of the face, suffusion of the eyes, and great restlessness and irritability. The countenance expresses indifference and confusion of mind. Questions are answered slowly, and as if with difficulty, but rationally. There is great prostration of strength, the patient lying on his back, and being unable to rise without assistance. He sleeps little, his sleep is disturbed by dreams, and he wakes unrefreshed; but in some cases there is great drowsiness. The tongue, which is at first clean and smooth, or covered with a white fur, or marked with a dry brown streak along, or on each side of, the middle line, becomes uniformly covered with a dry brown fur.

During this early stage some indications of local disease generally show themselves. Diarrhœa sometimes sets in, the evacuations being usually of the colour of yellow ochre, or of a darker colour, and very offensive. There is some uneasiness on pressure, especially in the right iliac fossa, which is also somewhat tympanitic, and gives to the hand the impression of containing fluid mixed with air. The presence of some degree of congestion of the lungs is also indicated by increased frequency of respiration, and by diffused mucous râle and slight sibilus, heard on applying the ear or stethoscope to the chest. The disturbance of the circulation through the brain, and the altered condition of the blood, are also evidenced by the symptoms just enumerated. In rare instances, even during this early stage, the urine is suppressed, and requires to be drawn off by the catheter. In other instances it is merely scanty, high-coloured, and offensive to the smell. During the second stage, and commonly from the fourth or fifth to the seventh or eighth day, but sometimes as late as the fourteenth day, a peculiar eruption appears on the skin of the abdomen, chest, and back; sometimes also on the extremities, but rarely on the face. After the patient has remained in this state for a week or ten days, he either shows signs of amendment, and gradually recovers, or he sinks into the condition familiarly known as the *typhoid state*.

In this typhoid state all the symptoms of debility are more marked. The patient lies helplessly on his back, with his mouth open, and sinks towards the foot of the bed; his voice is scarcely audible; he swallows with great difficulty; the tongue is protruded tremblingly, and as if with hesitation; and there are tremblings and catchings of the hands and limbs. The patient is delirious, and either talks loudly and incessantly, and makes constant efforts to get out of bed, or mutters indistinctly to himself. From this state he may generally be roused by addressing him in a loud tone of voice, when he will converse rationally for a time, and answer questions, but soon relapses. He is hard of hearing, and sees indistinctly, and he grasps at objects in the air, or picks at the bed-clothes. The pulse becomes very frequent,

weak, and compressible, perhaps unequal and irregular; the dry brown tongue becomes black; dark sordes accumulate on the teeth and lips; bed sores form on the hips and sacrum; the fæces pass involuntarily; the urine is retained or dribbles away unconsciously; the abdomen is tympanitic, and when firmly pressed, especially over the epigastrum and right iliac fossa, shows itself by the countenance of the patient to be the seat of pain. The evacuations from the bowels, which are usually of a yellow-ochre colour, and of the consistence of thin pea-soup, and contain large flakes of thickened mucus deeply tinged with bile, at length contain blood, sometimes in large quantities; or they are dark and grumous, resembling coffee-grounds; and blood is effused under the skin, in smaller or larger quantities, in numerous round spots known as *petechiæ*, or in large irregular blotches. From this typhoid state the patient either recovers by a gradual amendment of all the symptoms, or after some profuse and *critical* discharge, of which that by the skin is the most common; or he sinks more or less rapidly, and dies exhausted or comatose; or suffocated by the accumulation of mucus in the air-passages, as evidenced by the death-rattles.

Secondary Affections.—*Head Affections.* A congested state of the membranes, and occasionally of the substance of the brain, occurs more or less in all cases of continued fever in this country, but especially in the *typhous*, as distinguished from the *typhoid* form. It is indicated by a dusky redness of the face, increased heat of scalp, and injection of the conjunctiva, an extreme degree of stupor, constant muttering delirium, increased frequency with great feebleness of pulse, irregular distribution of heat over the surface of the body, and a dark, dry, furred tongue, protruded with difficulty, and slowly withdrawn. When the condition of the brain is rather that of inflammation than of congestion, there is great heat of the face and scalp, intolerance of light and sound, and delirium characterised by loud talking and constant efforts to get out of bed; and the patient, if not narrowly watched and forcibly restrained, will sometimes effect his escape from his attendants, and throw himself out of window, or place himself in circumstances of great danger.

Chest Affections.—Catarrhal symptoms due to the same congestion of the vessels of the air-passages that exists in the membranes of the brain, often occur very early in the disease. This complication is indicated by slight dyspnœa, with a cough, at first dry, but afterwards accompanied with clear mucous expectoration, sometimes streaked with blood. The ear detects the mucous rhonchus. This affection is rarely dangerous; and in favourable cases is soon and easily subdued. *Pneumonia* and *pleurisy* may also occur as secondary affections. Their symptoms are apt to be masked by the torpor of the senses and of the mind, rendering the patient insensible to pain. The stethoscopic signs of these affections are the same as in idiopathic maladies of the same kind. Aphthous ulceration of the mouth and *throat*, cynanche tonsillaris, cynanche laryngea, and cynanche paro-

tidea are of occasional occurrence: the latter is often a favourable symptom.

Affections of the Abdomen: Gastritis.—Patients are often attacked, towards the end of the first and beginning of the second week, with nausea and vomiting; but the patient does not complain of pain, which is only made apparent in the expression of the countenance, by deep pressure in the epigastrium. The vomited matters are yellow, green, or dark and grumous, from containing large quantities of blood.—*Enteritis.* This affection is indicated by distension and firmness of the abdomen, pain and tenderness on pressure, and, in most cases, by yellow diarrhœa. In enteritis, as in gastritis, there is pain on pressure. The disease may assume the form of idiopathic inflammation, or may consist in a peculiar affection of the glands of the intestines, presently to be noticed. Perforation of the stomach or of the intestines sometimes occurs. *Hepatic disorder*, accompanied by jaundice, is another complication. All the other viscera of the abdomen are subject to occasional congestion or inflammation.

The Skin.—The skin is the seat of several secondary affections in typhus fever. The following forms have been recognised:—1. Small spots closely resembling freckles; met with only in advanced stages of fever, a short time before death. 2. *Petechiæ*, occurring sometimes early, but more commonly towards the close of the disease. The size of the spots varies from that of a pin's head to that of a crown piece. Sometimes the effusion of blood is still more abundant, and the spots assume the form of large blotches or bruises. 3. *Sudamina*, in the form of small transparent vesicles, are also of not infrequent occurrence, and in some epidemics have been invariably present. They are generally found on the chest, neck, and arm-pits. 4. *Erysipelas* is apt to occur as a secondary affection when idiopathic erysipelas is prevalent. 5. *Gangrene* and *sloughing*, preceded by erythema of the skin, are common occurrences in the advanced stage of the disease, in parts submitted to pressure.—6. The characteristic rashes are described at p. 310.

Anatomical characters.—In the *mucous membrane of the stomach and intestines*, inflammation, softening, and ulceration, and especially inflammation and ulceration of the clustered glands of the intestines (*glandulæ agminatæ*, Peyer's glands), occupying, for the most part, the ileum near its termination in the cæcum, and more rarely of the solitary glands. This disease assumes various forms,—as the soft, the hard, the granular, the pustular, the ulcerous, and the gangrenous. It sometimes terminates in perforation. These morbid appearances are often accompanied by inflammation of the mesenteric glands. Ulceration of the pharynx is occasionally present. The diseased state of the *ileum* is considered to be characteristic of the typhoid form of fever. Softening of the parenchymatous substance of all the organs—the brain, the heart, the liver, the spleen, the kidneys—congestion, or inflammation of the lining membrane of the bronchial tubes, or of the

substance of the lungs; pulmonary hepatisation in its several stages; inflammation or congestion of the membranes of the brain, and more rarely of its substance, with serous effusion; inflammation of the pleura, or peritoneum; the several appearances of the skin already described; to which may be added a want of cohesion of the blood itself.

SEQUELÆ.—*Relapses* brought on by want of care, by premature exposure to cold, by unsuitable diet, or by a premature resumption of business, are of common occurrence *in fever*. In some epidemics the tendency to relapse has been so remarkable as to lead to the designation, *relapsing fever*. *Œdema*, a common consequence of the debility of the capillary vessels, soon disappears with returning strength. *Perforation of the bowels*, characterised by a sudden and acute pain in the abdomen, is among the sequelæ of continued fever. Rheumatism, neuralgia, a swelling of the leg resembling phlegmasia dolens, phthisis pulmonalis, mania, and various local inflammations, are among the more remote sequelæ.

VARIETIES.—Each epidemic of fever has its own peculiarities. In some epidemics the symptoms are inflammatory, and blood-letting is indicated; in others typhoid, and stimulants are the appropriate remedies. In one epidemic the brain suffers most, in another the mucous membrane of the intestines, in a third the lungs, in a fourth the liver, in a fifth the pulse falls below the healthy standard. In some epidemics, *petechiæ* have been almost uniformly present, in others *sudamina*. Some epidemics have been characterised by a tendency to hæmorrhages, others by the early and general appearance of bed-sores. The duration of the disease has also been very different in different epidemics; the majority of cases terminating on the fifth or seventh day, or at the end of the second, third, or fourth week. Its severity has also varied in a very remarkable manner. In some epidemics, death has often occurred in a few hours or days, in the first, or cold, stage, with signs of congestion, petechiæ, and hæmoptysis; in others, death has taken place in from 24 to 36 hours, without any marked symptoms, and with no tendency to reaction.

There is also reason to believe that in the same season and place, two or more types of fever may coexist, marked by very characteristic differences, and each confined to certain sub-districts. We owe the proof of this fact to Dr. W. Jenner, who distinguishes the two leading varieties as TYPHUS and TYPHOID.

Typhus fever attacks persons of the mean age of nearly 42 years; in typhoid fever the mean age is 22 years. In typhus fever relapses do not recur; in typhoid fever they are very frequent. In typhus fever Peyer's glands escape; in typhoid fever they are diseased. The eruption of typhus fever appears from the fifth to the eighth day; that of typhoid fever from the seventh to the fourteenth. In typhus fever the spots continue till the death or recovery of the patient; in typhoid fever each spot lasts about three days. In typhus fever no *fresh spots* appear after the second or third day of the eruption; in

typhoid fever fresh spots appear every day or two during the whole course of the disease. The eruption in typhus fever consists of dusky pink spots of irregular outline, which in two or three days deepen in colour, fading, but not being removed by pressure; and in some instances being dark-purple in the centre, unchanged by pressure, and passing into petechiæ. The spots are very numerous, and are usually found on the trunk and extremities, but sometimes only on the trunk. In typhoid fever, the patches are circular, of a bright rose colour, papular, slightly raised, but not pointed; disappearing entirely on pressure, and reappearing when the pressure is removed; few in number (from six to twenty at a time), and generally occupying the abdomen, chest, and back.

CAUSES.—*Predisposing.*—Youth, and middle age. Feeble constitution. All causes of debility, such as privation, exposure, fatigue, or excess; especially the fatigues, exposure, and privations of war; cold and wet seasons; filth and overcrowding; depressing passions of the mind. Hereditary peculiarity. But the strongest and most robust persons are by no means free from attacks of fever.

Exciting.—Contagion and infection direct from the person or by articles of clothing. Filthy and overcrowded dwellings. Fever also occurs in thickly-inhabited houses placed over foul cesspools or badly-constructed drains; and in damp houses, in low rich soils, where it is not possible to trace the influence of contagion.

Proximate or Essential.—Some observers, as those of Paris, witnessing epidemics in which gastro-intestinal irritation exists in the majority of cases during life, and a peculiar affection of the glands of the intestines after death, have regarded this state of the intestinal canal as the essential cause of fever; hence the theory of Broussais; others, again, in our own country, having observed cerebral complications in the majority of cases, have assumed them to be the cause; hence the theory of Dr. Clutterbuck. The majority of medical men are now convinced that these theories are fallacious, and the best and most recent authorities agree in representing fever as a disease *sui generis*, liable to be complicated with, but not caused by, local affections.

Laws of Infection.—All the forms of continued fever are believed to be more or less infectious; but the infection, unless in cases of extreme overcrowding and neglect, is by no means virulent, and is believed not to extend beyond a few feet from the person. The infectious matter attaches itself to clothes, bedding, and furniture. The protection afforded by one attack of fever is smaller than in the case of the febrile exanthemata, so that it is not uncommon to find physicians and nurses in fever hospitals having several attacks of the disease. In clean, spacious, and well-ventilated buildings the risk is very small, except to those in close attendance on the sick.

PERIOD OF INCUBATION.—From 7 to 72 days (Haygarth). From 13 to 68 days (Bancroft). From 10 to 18 days (Sir W. Burnett).

10 days on the average (Dr. Gregory). From a few hours to a few weeks, or perhaps to a few months (Dr. Robert Williams).

STATISTICS.—*Influence of age on the prevalence of the disease.*—The chance of seizure, between 15 and 20 years of age, being represented by 100, is reduced between 5 and 10, to 31; between 10 and 15, to 62; between 20 and 30, to 78; between 30 and 40, to 49; between 40 and 50, to 29; between 50 and 60, to 15; and above 60, to 4½. (From data supplied by Dr. Cowan, for the epidemic of Glasgow in 1836.) *Influence of Sex.*—Males, 49·5 per cent.; females, 50·5 per cent. (Glasgow epidemic.) Males, 43 per cent.; females, 57 per cent. (Edinburgh epidemic of 1819.) If it is borne in mind that females are always in excess of males, and that they are more employed about the sick, the influence of sex in predisposing to fever will appear inconsiderable.

MORTALITY.—The annual number of deaths from fever in the metropolis in a million of living persons, varies from 600 to 1,600, and averages 950. *Rate of Mortality.*—In Edinburgh, from the year 1817 to 1838, from 1 in 30 to 1 in 6·27; in Glasgow, in the epidemic of 1835-37, from 1 in 15 to 1 in 10; in Manchester, from 1818 to 1828, from 1 in 11·75 to 1 in 6·66; average for the whole period, 1 in 8·25; in the London Fever Hospital, during the same number of years, from 1 in 10 to 1 in 5; average of the whole period, 1 in 6·50. In the year 1816, one-fourth of all the fever cases admitted into Guy's Hospital died (Dr. Marcet); whilst one-half of all the seizures proved fatal in Dr. Willan's experience at the Carey-street Dispensary. In the Parisian fever, complicated with gastro-enteritic affection, the mortality, according to Louis, has been as high as 1 in 2·9; and the experience of Andral and Chomel gives very similar results. *Mortality at different ages.*—In the Edinburgh epidemic of 1818-20, in which the mortality was 1 in 22 for all ages, the deaths under 20 were 1 in 65; between 20 and 30, 1 in 29; between 30 and 40, 1 in 18; between 40 and 50, 1 in 11·4; and between 50 and 60, 1 in 6. These numbers represent the general rule, but the rule is liable to exception: thus, in the London Fever Hospital, during the years 1828-29, when the general mortality of the hospital was 1 in 7·22, that for children under 15 was as high as 1 in 7·33; between 15 and 30, 1 in 9·5; between 30 and 50, 1 in 7·33; and above 50, 1 in 2·5. *Mortality in the two sexes.*—According to the tables of Dr. Cowan of Glasgow, founded on an examination of 2,259 patients, the deaths for all ages amounted to 1 in 6·75 among males, and only 1 in 11·2 among females; to 1 in 25 for boys, and 1 in 28 for girls. Dr. Welsh's tables (743 patients, in the Edinburgh epidemic of 1817-20) give 1 in 16 for males, and 1 in 30 for females; under 20 years of age the mortality for both sexes was 1 in 68; above 20, for men, 1 in 11, for women, 1 in 24. This disparity after 20 is ascribed by Dr. Christison to the greater prevalence of intemperance among men.

Duration of continued fever.—From tables contained in Dr. Davidson's Thackeray Prize Essay, it appears that the duration of synocha (by him named febricula), in 30 cases, was from 3 to 10 days, the average being 8 days for males and females; whilst the duration of eruptive typhus, calculated from 181 cases, was 19·7 days for males and 21·3 days for females, the average for the two sexes being 20½ days. The least duration in males was 12 days, the greatest 29 days; in females, the least duration was 13 days, the greatest 54 days. The duration of the disease is calculated from its commencement to the establishment of complete convalescence.

Critical days.—The ancient doctrine that favourable cases of fever have a decided tendency to terminate on certain days, called critical days, has been confirmed by the observations of Dr. Welsh in the Edinburgh epidemic of 1819. The critical days are 3, 5, 7, 9, 11, 14, 17, 20; the non-critical are the intervening days, with the exception of the 4th and 6th, which are considered as secondary critical days. Of 690 cases, a crisis took place in 470 on critical days, in 52 on the secondary days, and in 108 on non-critical days. The cases included all the forms of fever.

DIAGNOSIS.—From idiopathic local diseases, by the history of the symptoms, and the want of correspondence in fever between the severe general disturbance and the comparatively slight local affections. Also, in the majority of cases, by the presence of the peculiar eruptions on the skin. From severe cases of catarrh and influenza, by the absence of the herpetic eruption on the lips and chin, which often characterise those diseases. The typhoid state in which many severe local diseases terminate can only be certainly distinguished from typhus fever by the history of the case. For the difference between the *typhous* and *typhoid* forms of continued fever, see p. 310.

PROGNOSIS.—Cautious and guarded even in favourable cases. *Favourable symptoms:*—the absence of local complication; the debility not extreme; the tongue still moist, or not greatly coated; the pulse steady and compressible, and not very frequent; the respiration infrequent; the skin of moderate and uniform temperature, and rather above than below the natural standard; the countenance clear and not flushed; the eye uninjected; the posture approaching to that assumed by healthy persons; the absence of delirium and stupor: to these must be added youth. About the fifth, seventh, fourteenth, or twenty-first day, the tongue peeling and becoming moist, first at its edges, afterwards on its surface; a moisture breaking out upon the skin; bilious vomiting late in the disease; a gentle diarrhœa; the pulse becoming fuller and more slow; the cessation of delirium, with some return of sleep and appetite; hæmorrhage from the nose, followed by relief of symptoms; the appearance of aphthæ, of scabby eruptions about the mouth, or of phlegmonous tumours in different parts of the body; the urine increasing in quantity, and depositing a sediment.

Unfavourable Symptoms.—The existence of severe local disease;

extreme debility; dry, brown, coated tongue; frequent, small, and irregular pulse; skin universally hot, or the temperature unequally distributed; the countenance muddy; the eyes suffused; extreme anxiety and restlessness; extreme acuteness of hearing; decubitus on the back; the body falling towards the foot of the bed; active, or low muttering delirium; coma; subsultus tendinum; *muscæ volitantes;* picking at the bed-clothes; involuntary evacuations; hæmorrhage from the stomach or bowels; retention of urine; tympanites; petechiæ; gangrene and sloughing of the back and sacrum; erysipelas. In estimating the importance of these symptoms, whether favourable or unfavourable, the character and tendency of the existing epidemic, and of other diseases prevailing at the time, must be borne in mind. It must also be understood that these symptoms, though unfavourable, are not such as to preclude all hope of recovery. The risk from fever is great in persons of advanced age; and greater in the affluent than in the poor.

TREATMENT.—Continued fever can only be effectually treated on general principles, applied to individual cases, with due regard to the character of the existing epidemic, the peculiarity of the patient's constitution, and the period of the disease. Experience has proved that there is no stage of the disease at which remedies will prove effectual in cutting it short, and that it will run a certain course, and endure for a certain period, in spite of remedies. In every stage of the disease, and in every part of the treatment, therefore, the practitioner must bear this fact in mind. If, in the early stage, the disease appears to call for prompt antiphlogistic treatment, it must be recollected that a period of depression is at hand, and that that depression will be increased by undue activity in the early stage. On the other hand, it must not be forgotten that local complications are apt to occur in the course of the fever, which may be aggravated by a neglect of proper antiphlogistic measures during the period of reaction. Moderation in the use of remedies, constant watchfulness, and early and prompt attention to symptoms of local complication, are peculiarly necessary in all cases of continued fever. To insure the discovery of local complications, it is essential that the state of the brain, chest, and abdomen, and of the parts on which the patient lies, should be ascertained at every visit by inquiries and examinations directed to those parts. It is especially important that the state of the urinary bladder should be ascertained by examination with the hand, and that, if necessary, the urine should be regularly drawn off.

The management of the sick-room is also of the first importance. A skilled and practised nurse should, if possible, be procured. The excreta should be immediately removed, and soiled linen be placed in water. The person of the patient should be kept very clean, and the sheets and body linen be changed frequently with as little fatigue as possible to the patient. The sick-room should be kept cool and airy, shaded and quiet. A small fire should be kept burning, even in *mild weather*. Saucers containing chloride of lime, moistened with

a weak acid, may be placed in convenient situations in and about the room.

The treatment of continued fever must vary with the stage of the malady, and will be best considered under the heads of:—1. The incipient period. 2. The period of reaction. 3. The typhoid period; and 4. The period of convalescence.

1. During the incipient period, or, at the outset of the malady, the indications are—(*a.*) To remove from the primæ viæ any matter which, in a later stage of the disease, may become a source of irritation; and (*b.*) To place the patient in the most favourable condition for passing through the remaining stages of the disease.

a. The remedies to be prescribed, with a view of fulfilling the first indication, are emetics and purgatives. The emetic, which is only indicated in those cases where much nausea exists, or there is reason to believe that the stomach is overloaded, may consist of a grain of tartar-emetic and a scruple of ipecacuanha. The best purgative is castor-oil, in the dose of half an ounce or an ounce; to be repeated if necessary. The castor-oil may be preceded by any suitable mercurial preparation.

b. The second indication is best fulfilled, in the greater number of cases, by abstinence from active treatment. It is only in very plethoric subjects, or where there are marked symptoms of cerebral congestion, that blood-letting is indicated, and even in such cases it should be practised with great caution and moderation. When the pain in the back and loins is extremely acute, the abstraction of a small quantity of blood by cupping to the loins is to be preferred.

2. During the period of *reaction*, which rarely extends beyond the first week, the chief indication is to moderate febrile action and relieve local symptoms by the smallest possible expenditure of strength. The remedies most efficacious for this purpose are general and local bleeding, tartar-emetic, and the application of cold to the surface.

By *bleeding*, should this remedy be deemed indispensable, our object is to produce the greatest possible effect at the smallest cost of blood. The patient, therefore, should be supported in the semi-erect posture, raised in bed; a free orifice should be made in the vein, and blood be taken to the approach of syncope. Among the populations of large towns, and even in country places, in the type of fever which now generally prevails, bleeding is decidedly contraindicated.

Tartar-emetic may be administered with advantage whenever fever is accompanied by high action. It may be given in doses of an eighth of a grain every two, three, or four hours, and in the absence of diarrhœa, may be advantageously combined with small doses of sulphate and carbonate of magnesia.

The application of cold to the surface is only indicated when the temperature of the skin is above the natural standard, as measured by the touch or by the thermometer, and should be continued no longer than it is agreeable to the patient. The best mode of applying cold is by sponging the entire surface with warm, tepid, or cold water, or with vinegar and water, and allowing it to evaporate until the heat

is reduced, and the pulse lowered. When these effects have been produced, or the patient complains of chilliness, the body should be carefully dried with a warm towel. The remedy may be repeated as often as the temperature of the skin rises steadily and uniformly above the natural standard. In mild cases the hair should be thinned, or cut short, and kept constantly moist with iced-water squeezed out of a sponge. In more severe cases, the head should be shaved and kept cold by cloths dipped in cold lotions, and constantly renewed. The patient should be allowed to drink freely of cold water. Where there is much fever, iced-water or ice may be allowed, according to the degree of thirst.

Complete rest of mind and body, external quiet, cleanliness, and a free supply of pure air, should be strictly enjoined from the first, and during the whole course of the disease.

3. During the *typhoid period*, or that state of continually increasing debility which follows the period of reaction, the indications are—(*a.*) To moderate febrile action. (*b.*) To support the strength of the patient. (*c.*) To subdue local inflammations and congestions, and relieve urgent local symptoms.

a. The first indication is to be fulfilled by cold or tepid sponging to the skin, and cold to the head; by cooling drinks, of which iced-water is the best; and by a diet, consisting of tea, barley-water, lemonade, and ripe fruits.

b. When the patient's strength begins to fail, stimulants must be administered with care and caution, being guided in our selection and in the dose employed by the degree of the existing debility. Wine or brandy administered at regular intervals is to be preferred. If it is deemed necessary to give any medicine, in addition to these, ammonia, or æther (the nitric, chloric, or sulphuric), may be given alone or in combination. A more nourishing diet, consisting of sago, arrowroot, rice, and light broths, should also be prescribed.

Ammonia may be used with great advantage in those cases where some doubt is entertained of the propriety of administering stimuli. Its effects being of short duration, should it be found to raise the pulse or increase the fever, it may be withdrawn, without leaving behind it any permanent bad effects.

When the debility is extreme, and all the typhoid symptoms strongly marked, wine or brandy must be liberally administered, the former to the extent of from half-a-bottle to one or even two bottles a-day, the latter to the amount of a quarter or half-a-pint, or even more. When the symptoms are less severe, from two to four or six ounces of wine may be given daily. Patients who have previously indulged in habits of intemperance will require to be still more liberally supplied. Beef-tea, thickened with arrowroot, strong animal jellies, and the stronger soups should also be given to the patient in small quantities and at short intervals.*

* Chlorate of potash (one drachm in a pint of water) has been recommended as a stimulant drink.

The choice of stimulants should be determined by the degree of the debility, the amount of febrile action, the presence or absence of local affection, and the character of the pulse and tongue. When the pulse is frequent, hard, and quick, and the tongue clean, or slightly furred, stimulants are contraindicated; but when the pulse is frequent, small, and compressible, or infrequent and compressible, and the tongue coated with a dark fur, stimulants may be given with safety. When stimulants render a frequent pulse less frequent, or but slightly increase the number of an infrequent one, and when the aspect of the tongue improves under their use, they may be safely administered. In doubtful cases, the practitioner will do well to visit patients labouring under fever soon after the administration of the first dose of the stimulant, or to administer it with his own hands, and ascertain by its effect on the pulse whether or not the treatment he is adopting is a safe one.

c. In fulfilling the *third indication* (namely, the subduing of local inflammation, and the relief of urgent local symptoms), the necessity of sparing the blood and strength of the patient should be constantly borne in mind. As the *brain* suffers more or less in all cases, it is desirable to guard against inflammation, and to subdue it where present, by having the head shaved, and applying cold water, iced-water, refrigerating lotions, or the ice-cap, according to the severity of the existing symptoms. When the conjunctiva is injected, and there is much cerebral congestion, from six to twelve, or twenty leeches may be applied to the temples. If the patient suffer from protracted sleeplessness, with extreme restlessness, and a condition allied to delirium tremens, and especially if there is reason to believe that he has been intemperate, a full dose of some preparation of opium is indicated. (From 20 to 30 drops of laudanum, or from a third to half a grain of the acetate or muriate of morphia.) The dose may be repeated after an interval of from 4 to 6 hours, if attended with marked benefit. It may also be advantageously combined with tartar-emetic in doses from an eighth to a quarter of a grain. In some cases the opiate is best administered in the form of injection (a drachm of tincture of opium in half-a-pint of thin gruel). These means may require to be assisted by the application of a few leeches to the temples, or behind the ears, or by cupping to the back of the neck. If *coma* supervene, a blister to the scalp may be prescribed with advantage.

When the stethoscopic signs indicate the presence of *pneumonia*, blood may be taken away in small quantities by leeches or the cupping-glass; or, if the symptoms are less severe, a blister or mustard poultice may be applied over the part of the chest most severely affected. *Bronchitis* will not require any special treatment beyond a mustard poultice to the chest.

The state of the *bowels* requires to be closely attended to. If they do not act naturally, the hydrargyrum c. cretâ, in doses of from 2 to 5 grains, followed after an interval by a dessert-spoonful of castor-oil, will generally suffice. *Diarrhœa* is best relieved by a few

grains of Dover's powder, or by a combination of a single grain of hyd. c. cretâ, with two or three grains of the soap and opium pill, or of the extract of poppy. Diarrhœa may also be advantageously treated by enemata consisting of half an ounce of syrup of poppies in a pint of boiling water, or thin gruel. If, on pressing the abdomen, tenderness is present either at the pit of the stomach, or in the iliac regions, from 4 to 6 or 8 leeches, followed by a light warm poultice, should be applied to the tender spot. When the patient is too weak to bear the loss of blood, a large, warm, linseed-meal poultice to the abdomen often gives perceptible relief. Obstinate diarrhœa with tympanites is best relieved by injections of thin gruel with turpentine. In some instances blisters to the abdomen have been productive of great relief to both these symptoms.

Sloughing of the integuments of the hips and back should be guarded against by rubbing any red spots that may make their appearance frequently with brandy or the soap liniment; when the skin is broken, it should be protected by the soap or *amadou* plaster. The risk of extensive sloughing may be averted by the *water-bed* or the *rheiocline*.

The state of the bladder must be carefully watched, and the urine, if retained, must be drawn off two or three times a-day, the patient being at the same time kept scrupulously clean.

Throughout the disease, the patient should be narrowly watched, so that new local complications may be treated as soon as they arise. It must also be borne in mind, that in consequence of the diminished sensibility of the patient to internal as well as external sensations, inflammation of internal organs may occur, and make some progress before it is discovered. It is, therefore, not to the sensations of the patient, but to the other symptoms and signs of disease, that the medical man must trust for early information of the presence of local complications.

4. Convalescence requires much care and watching. Two indications are to be fulfilled—to restore the strength, and to guard against relapse. The strength will be best restored by the gradual substitution of nourishment for stimuli, the nourishing quality of the food being increased as the stimuli are withdrawn. When, however, the debility is very great, and, as often happens, there is a constant tendency to fainting, stimulants must be administered frequently and in large doses. In the commencement of convalescence, simple farinaceous diet should be prescribed, or farinaceous diet with milk, then the weaker soups, then fish, boiled or fried, then the boiled or roasted meat of full-grown animals. In the regulation of the diet, the appetite is the best guide, and this should determine both the quality and the quantity of the food.

A foul dry tongue, increased frequency and sharpness of pulse, flushing of the face, and disturbed sleep, are indications that the diet is too large in quantity, or of too nourishing a kind. If the patient is restless, and obtains little sleep, opium or morphia, in combination *with a stimulant*, may be administered. The cautious regulation of

the diet, an avoidance of all violent exertion, and of exposure to cold, will generally prevent a relapse.

PROPHYLAXIS.—Separation of the sick from the healthy; spacious and airy apartments; complete ventilation by opening the windows several times in the day in cold, and constantly in warm weather; by leaving the door open, or from time to time swinging it repeatedly on its hinges, and by a fire in the open chimney; fumigations with chlorine, and scrupulous cleanliness; frequent change of linen; and the prompt removal of excretions, are the chief precautions to prevent the spread of contagion.

The attendants on the sick should not be young persons, and they should be selected, if practicable, from such as have already had an attack of fever. During their attendance, their diet should be nourishing, they should avoid excessive fatigue, should practise frequent ablution, and be allowed regular exercise in the open air. All unnecessary intercourse of other persons with the sick should be prevented. Rooms which have been occupied by fever patients should be thoroughly cleansed and ventilated, the floors scrubbed, the paint cleaned, the paper renewed, and the ceilings whitewashed. The bedding and furniture should be freely exposed to the air: the bed-clothes and body-clothes of the patient should be washed, and other articles of dress exposed to a temperature of 200°; and in the more severe cases, the stuffing of the pillows and bed should be cleansed. These directions may be carried out with a strictness proportioned to the severity of the epidemic, and of the case. In ordinary cases the more inconvenient and expensive might be omitted without much fear of the consequences.

In hospitals, in addition to the foregoing precautions, care should be taken not to bring fever cases together, but to scatter them among the other patients. In fever hospitals from 1500 to 2000 cubic feet of air should be allowed to each patient.

REMEDIES.—Emetics given at the outset, with a view of cutting fever short. Cold affusion administered with the same intent. Blood-letting, under the supposition that the essence of fever consists in inflammation of the brain, or of some other important organ. Mercurial preparations to the extent of affecting the mouth, with a view of superseding or suspending the febrile action. Bark or quinine in doses of from 5 to 10 grains every two or three hours, given at the outset of the disease, and also in its more advanced stages, in the absence of visceral complications. These remedies, as means of curing fever, have justly fallen into disuse.

FEBRIS EPHEMERA—EPHEMERAL FEVER.

SYNONYM.—Simple fever. Feverishness.

DEFINITION.—A continued fever, of slight degree and short duration, which often runs its course in twenty-four hours.

SYMPTOMS.—After slight rigors, of short continuance, with nausea, loss of appetite, and feelings of indisposition, increased heat of surface, headache, a frequent pulse, a furred tongue, and slight thirst. These symptoms generally terminate by perspiration.

CAUSES.—Exposure to cold, a meal of unwholesome food, a debauch, over-fatigue. The contagion of typhus fever acting upon a strong constitution, or that of any of the exanthemata acting on a person who has already had the disease once?

DIAGNOSIS.—From severe forms of continued fever by the mildness of the symptoms. Caution, however, is necessary in expressing an opinion, as the first onset of severe cases of continued fever, and of the exanthemata, is often not more strongly marked than a case of ephemeral fever.

PROGNOSIS.—Favourable in proportion to the mildness of the symptoms, but guarded, bearing in mind the fact just stated.

TREATMENT.—Rest in bed, farinaceous food, and cooling drinks pure air, and a gentle saline aperient. (Prescription 304.)

FEBRIS INTERMITTENS—AGUE.

SYNONYMS.—Intermittent fever. Fever and ague.

DEFINITION.—A fever caused by marsh miasmata, and consisting of febrile paroxysms,* occurring at stated intervals with perfect intermissions.

VARIETIES.—1. The *Quotidian;* a paroxysm once in every 24 hours. 2. The *Tertian;* a paroxysm once in every 48 hours. 3. The *Quartan;* a paroxysm once in every 72 hours. Other varieties of less importance are—1. The *double quotidian*, having two paroxysms every day. 2. The *double tertian*, in which a paroxysm occurs every day, those of the alternate days being of equal duration and intensity. 3. The *triple tertian*, in which two paroxysms occur on one day, and only one on the other. 4. The *duplicated tertian*, which returns twice on each alternate day. 5. The *double quartan*, in which a paroxysm occurs on the day succeeding that of the regular quartan, so that there is a perfect intermission only on the third day. 6. The *duplicated quartan*, in which two paroxysms occur on the day of attack, with two days of intermission. 7. The *triple quartan*, in which a slight paroxysm occurs on each of the usual days of intermission. These forms of ague, as well as those which have longer intervals (such as five, six, seven, eight, nine, or ten days, a month, or a year), and are called *erratics*, require the same treatment as the three primary types.

SYMPTOMS.—Ague sometimes attacks a patient suddenly; but in the greater number of cases it is ushered in by symptoms similar to those which mark the onset of continued fever; and it is not till after several days, or even one or two weeks, that the disease assumes its perfect form. It is then recognised by the occurrence of febrile paroxysms at regular intervals of time. A paroxysm of ague consists of three stages, which follow each other with great regularity;—a cold, hot, and sweating stage.

The Cold Stage.—Langour and listlessness; sighing, yawning, and stretching; pallor; blueness of the ears, lips, and nails; shrinking of the features; and constriction of the skin of the whole body (*goose-skin* or *cutis anserina*); a sense of oppression at the pit of the stomach; violent shiverings, chattering of the teeth, and trembling of the limbs; pain in the head, back, and loins; the secretions diminished; the urine scanty, pale, and limpid; the pulse small, frequent, and sometimes irregular; and the respiration short and anxious. These symptoms terminate at length in universal and convulsive shaking.

The Hot Stage.—The heat of the body gradually returns; at first irregularly, by transient flushes, which are succeeded by a steady, dry,

* The period between the end of one paroxysm and the beginning of the next, is called the *intermission:* the period occupied by one paroxysm and one intermission is called the *interval.*

and burning heat, rising much above the natural standard. The skin, before pale and constricted, is now swollen, tense, red, and pungent to the touch, the face flushed, and the eyes injected. The sensibility, which in the cold stage was diminished, now becomes preternaturally acute; the aching of the head is exchanged for acute pain. The pulse becomes quick, full, and hard; there is great thirst; the urine is scanty and high-coloured.

The Sweating Stage.—At length a moisture is observed to break out upon the face and neck, which, extending, soon becomes a universal and equable perspiration. The heat now descends to its usual standard; the pulse returns to its wonted frequency, and resumes its usual character, and the respiration becomes free and tranquil; the urine deposits a sediment; all the functions are re-established; and the patient is for a time restored to health.

Occasional Symptoms.—During the cold stage, coma or apoplexy; during the hot stage, delirium. Convulsions, extreme debility, syncope, rigid spasms, neuralgia, jaundice, dysentery, and petechiæ on the skin, have also been recorded. In ague districts, and in persons who have previously had ague, many diseases assume the intermittent character. Hemicrania, or intermittent face-ache, or brow-ague, is of very common occurrence in persons who have previously suffered from ague. Formerly ague was a very fatal malady; and even at the present day a form of it, known at Smyrna and elsewhere as '*pernicious fever*,' goes on increasing in severity up to the third paroxysm, when it proves fatal.

Duration of the Paroxysm, &c.—The quotidian is most common in spring, and generally occurs in the morning: usual duration upwards of twelve hours. The tertian type occurs both in spring and autumn, and commences at noon: usual duration about eight hours. The quartan is more severe, occurs in autumn, and its fit begins in general in the afternoon: duration usually about six hours. The quartan has the longest cold stage, the tertian the longest hot stage. The tertian is the most, and the quartan the least, common.

The type changes after some time, tertians and quartans becoming quotidians, and quotidians becoming remittents, and occasionally ending in continued typhus fever.

The paroxysms of ague are sometimes *obscure* (*dumb ague*), sometimes *incomplete*, occasionally *inverted*, sometimes irregular or *erratic*, sometimes *partial*, or affecting only a portion of the body.

Period of Incubation.—From a few hours to several days, weeks, or months. Average duration, from ten days to a fortnight.

Pathology.—During the cold stage, the blood leaves the capillaries of the surface of the body, and accumulates in the deep-seated large vessels; there is congestion in the head, chest, and abdomen; and the vascular spongy organs, especially the spleen, liver, and lungs, are liable to suffer. Accordingly, few persons, in whom the disease

has lasted for any length of time, entirely escape those local complications, especially enlargement of the liver and spleen.

TERMINATIONS.—In chronic enlargement, with induration, softening, or suppuration of the liver and spleen; in ascites and anasarca caused by, or connected with, visceral disease; in fatal dysentery; in apoplexy; in fevers of the remittent or continued type. In leucocythemia. (See p. 287.)

CAUSES. 1. *Predisposing.* Debility, however induced; intemperance; exposure to cold and moisture; middle age; the male sex; a previous attack. 2. *Exciting.*—Marsh miasma, or the effluvia from vegetable matter in a state of decomposition. Also the effluvia arising from certain soils, impregnated with moisture, but *apparently* free from vegetable decomposition. The danger is greatly increased by exposure to these effluvia at night.

DIAGNOSIS.—Quotidian ague is distinguished from hectic fever by the coincidence, in hectic, of some disease (as pulmonary consumption), of which it is a symptom; by the occurrence of the paroxysm of hectic in the evening; by the clear complexion of hectic, contrasting with the sallow hue of ague; and by the character of urinary deposit, which in hectic is pink, in ague, lateritious. Strictures of the urethra, and abscesses in the perineum, and in other parts of the body, often give rise to severe shivering fits, followed by flushes of heat and perspiration, resembling the paroxysms of ague.

PROGNOSIS.—*Favourable circumstances.* In cold and temperate climates, ague soon yields to treatment; in warm climates it is a much more severe and dangerous malady. The paroxysms of short duration, regular in their recurrence, and the intermissions quite free from fever; the postponement of the paroxysms; the short previous duration of the malady; the quotidian and tertian types; the appearance of an herpetic eruption on the lips.—*Unfavourable.* The disease of long standing; the paroxysms anticipating the usual time of their return; a feverish state during the intermission; the paroxysms being of long continuance, violent, and attended with much anxiety and delirium; complication with other diseases; enlargement of the liver and spleen; the quartan type.

TREATMENT.—*In the Paroxysm.* During the first or *cold* stage. The patient should be put into a warm bed, and the warmth of the surface be restored as promptly as possible by a hot brick or bottle to the feet, bags of hot bran or salt to the pit of the stomach, aided by friction of the back and limbs, and the administration of warm diluents, such as tea, gruel, arrowroot, wine and water. The warm, hot-air, or vapour bath may be used, if convenient.

During the *second*, or *hot* stage, the remedies employed in the treatment of the first stage should be laid aside, and cool air, cooling drinks, and sponging with cold or warm water must be substituted.

During the *third*, or *sweating* stage, the patient must be kept quiet, wiped dry after it is over, and his clothes changed. He should then

be allowed to sleep. When there is much debility, stimulant drinks, such as warm brandy, or wine and water, may be administered.

Local symptoms present during any of the three stages of ague, must be treated as the corresponding idiopathic affections.

In the intermission.—The treatment during the intermission consists in the exhibition of one of those remedies which experience has shown to possess the power of preventing the return of intermittent paroxysms; of which remedies quinine and arsenic are the most powerful and efficient.

Cinchona bark, or its active principle, *quinine*, is the staple remedy for the cure of ague, and other intermittent disorders. The sulphate of quinine may be given in the form of pill or mixture, in doses of two grains, every two, three, or four hours during the intermission. Single doses of ten grains, ℈j., ʒss., or even more, have been recommended as of superior efficacy.

Arsenic is a remedy of at least equal power with *quinine*. It may be given in doses of 5 drops of Fowler's solution, gradually increased to 10 or 20, either alone or in combination with laudanum, every four hours during the period of intermission. Its effects must be carefully watched. If given in the form of draught or mixture, it may be combined with any of the tonic infusions.

℞. Liq. pot. arsenitis, ♏v.
Infus. quassiæ, fʒi.

This is the form of medicine which I employ in ague as it occurs in London; it never fails, and it never disagrees. (G.)

Previous to the administration of the specific remedy, the bowels should be freely opened by a brisk aperient, such as 5 grains of calomel, and 5 grains of colocynth, followed by a black draught.

Remedies.—*In the paroxysm, or before it.—Bleeding*, during the cold stage. This remedy is not necessary in the majority of cases of ague in temperate latitudes, except in very plethoric subjects, or where there are signs of congestion of any of the viscera. *Emetics*, given just before the fit, to prevent its occurrence, or during the cold stage, to hasten the approach of the hot fit. *Laudanum*, either alone or combined with ether, in the dose of one drachm of each, may be given with the greatest advantage, either before the cold fit, or with more effect during the hot stage. This remedy is strongly recommended by Drs. Trotter and Lind. A combination of ammonia (ammon. sesq., gr. v.), camphor (gr. v.) and aromatic confection (℈i), as given by Mr. G. Dawson at Walcheren.

In the intermission.—Sulphate of zinc; piperin, or the active principle of pepper; salicin, or the active principle of the willow bark; bebeerin; ilicin, or the active principle of the holly; camomile flowers, quassia, and a great variety of remedies belonging to the class of bitters and tonics have been used, and with success, as substitutes for quinine and arsenic. Cures have also been effected by the power of the imagi-

nation, or by a sudden shock to the mind; and by such remedies as charcoal, the charred wick of a candle, and cobwebs. In obstinate cases change of air is the best remedy.

PROPHYLAXIS.—Avoidance of the air of early morning and evening, and of sleeping-places near the ground. The choice of a habitation on hilly ground, or sheltered from the source of the malaria by trees. Warm and nourishing food before labour in malarious districts. Sailors should not sleep on land in malarious districts; and ships should be stationed at a distance of two or three miles from unhealthy coasts. A moderate allowance of spirituous liquors and tobacco. (?) Small doses of quinine two or three times a-day. The thorough drainage of the soil.

TREATMENT OF THE SEQUELÆ OF AGUE.—Diseases of the spleen and liver are the most common consequences of ague. The treatment required for these affections is change of air, local depletion often repeated, or dry cupping over the part affected, friction with the iodine ointment, or the external application of the tincture of iodine, and counter-irritation by blisters or setons. In disease of the liver, a course of gentle mercurial preparations, or of the nitro-muriatic acid, in doses of from ten to twenty drops in some tonic infusion. Mercurial inunction may also be used with advantage. Much benefit is often derived from a course of Cheltenham or Harrowgate waters. When the enlargement of these organs is accompanied by extreme pallor of countenance, preparations of steel are indicated.

The treatment of hemicrania, or brow-ague, is that of ague itself; as is also the treatment of those intermittent maladies which are known as masked ague, *e. g.* intermittent vomiting, diarrhœa, &c.

The treatment of the remittent or continued types of fever into which ague sometimes degenerates, is that of those types themselves, with the proviso that the first recurrence of the intermittent type should be met by the use of quinine, or arsenic.

REMITTENT FEVERS.

General Observations on Remittent Fevers.

The class of remittent fevers is one of great interest and importance to a nation which has soldiers and sailors scattered over the whole of the habitable globe, and serving under circumstances of great exposure, fatigue, and privation. Remittent fever, though by no means unknown in England, assumes in some of our dependencies a character of great malignity, rivalling, and even surpassing, the oriental plague itself in the violence of its attack and the mortality it occasions. The records of our army serving abroad show that even if we include stations in which the disease is unknown, or of the rarest occurrence, one soldier in every eight is attacked by remittent fever, of which eighth more than one in eight dies. If, however, we exclude from our calculation the stations in which remittent fever is wholly or nearly unknown, the attacks exceed 1 in 7, and the deaths amount to between a seventh and an eighth of the patients attacked. The severity of the disease, and the mortality it occasions, vary very widely in the places which it visits. In the Tenasserim provinces, for instance, it is as low as 1 in 27, at Bombay 1 in 25, at Malta 1 in 24; while it destroys 2 in 11 in Ceylon, 4 in 11 in the Bermudas, and 1 in 2 in Western Africa, on which fatal coast the attacks are nearly equal to the number of soldiers.

As a general rule, remittent fever may be said to be of rare occurrence and slight severity in cold and temperate latitudes, of frequent occurrence and greater severity in hot climates. In all climates it is a disease of marshes and low-lying undrained lands, and, in common with ague, occurs at seasons of the year when the paludal poison is not active.

The disease goes by different names in different places, sometimes deriving its title from the places in which it prevails, at other times from some prominent symptom. Thus we have the Walcheren, Levant, and Mediterranean fever; the jungle and hill fever of the East Indies; the lake-fever of America; the Bulam, Sierra Leone, African, and Bengal fever; the gall-fever of the Netherlands; the bilious remittent of the West Indies; and the yellow fever of Jamaica, Gibraltar, and the Bermudas.

The yellow fever, and the more severe forms of the disease, require for their development the combination of marsh effluvia and a temperature exceeding 75° Fahr. The low-lying spots near the coast are its favourite haunts, and it is believed to disappear at an elevation of about 2,500 feet above the level of the sea.

For practical purposes this important disease may be treated under the two heads of Febris Remittens, or Remittent Fever, and Typhus Icterodes, or Yellow Fever; the first comprising the milder forms of the disease, the second the more severe ones; the first being characterised by bilious symptoms of slight severity, the second by

bilious symptoms of great intensity; the first being a disease not more intractable than continued fever, the second being one of the most intractable and fatal maladies in existence.

FEBRIS REMITTENS—REMITTENT FEVER.

SYNONYMS.—Gastric fever. Bilious fever. Bilious remittent fever. Remittent marsh, or paludal fever.

DEFINITION.—A fever accompanied by distinct exacerbations of variable duration and severity, but without any complete intermission or apyrexia.

SYMPTOMS.—In the remittent fever of temperate latitudes, those of mild continued fever with periods of comparative freedom. Gastric irritation, with tenderness of the epigastrium, yellowness of the skin, and bilious vomiting, are very generally present in a greater or less degree. Diarrhœa is sometimes superadded; but in many cases aperient medicines are necessary, and in some instances the bowels are obstinately confined. The tongue is either remarkably clean, or covered with a thin fur, or redder than natural at the tip and edges. The pulse ranges from 90 to 120. Head symptoms are rare. When they occur they assume the form of melancholia, rather than of delirium, and in most cases the intellect is unusually clear. In the remittent fever of hot climates, the symptoms of gastric irritation and bilious disorder are more strongly marked; and violent delirium, with intense thirst and great heat of skin, often shows itself at an early period.

DURATION.—From five or six days to four or five weeks. Usual duration about a fortnight.

CAUSES.—*Predisposing.* Youth. All causes of debility.—*Exciting.* Marsh miasma, and the exhalations from low damp soils, especially during the summer and autumn months. The disease is most common and most severe in hot climates; but is by no means of rare occurrence in temperate latitudes. In England the disease is rare in large towns, but endemic in the most unhealthy rural districts.

DIAGNOSIS.—From intermittent fever by the incomplete intermission. From continued fever by the recurrence of intervals of comparative freedom from febrile excitement.

PROGNOSIS.—*Favourable*, in proportion to the distinctness of the remissions. *Unfavourable*, when the fever assumes the continued type, and in proportion as the symptoms resemble the unfavourable symptoms of continued fever.

TREATMENT.—That appropriate to continued fever (p. 314), so long as the intermissions are short and obscurely marked; and that of intermittent fever (p. 323), as soon as the intermissions become well marked, and of some continuance. Quinine or arsenic may then be given, as in ague, during the remission.

SEQUELÆ.—Diarrhœa and Dysentery.—Enlargement of the liver and spleen, and the peculiar anæmic state known as *leucocythemia*. (See p. 287.)

The more severe form of remittent fever is described under the next heading of Yellow Fever.

TYPHUS ICTERODES—YELLOW FEVER.

SYNONYMS.—Synochus Icterodes; Febris Remittens gravior cum ictero; Bilious Remittent Fever of warm climates; Bulam Fever; Mal de Siam; Vomito Negro; Vomito Prieto; Coup de Barre; &c.

DEFINITION.—A remittent fever accompanied by yellowness of the skin, partial or general, and by vomiting of a black or dark-brown fluid. (The disease assumes, in different epidemics, and often in the same epidemic, the several types of continued, remittent, and intermittent fever, and appears in every degree of severity, from simple ephemeral fever up to the worst form of typhus. Yellowness of skin and black vomit are to be regarded as characteristic of the fever in its most marked form.)

SYMPTOMS.—The disease commonly sets in with lassitude, listlessness, faintness, and giddiness, with frequent chills, acute pains in the back and limbs, pains in the head and eyeballs, a flushed face, an anxious expression of countenance, an injected, brilliant, and watery eye, and a hot, dry, and harsh skin. The mouth is clammy; the tongue generally white and moist, or watery, furred at the centre, and red at the tip and edges; and the patient is usually very thirsty. The pulse is increased in frequency, full, and hard; the respiration hurried, and interrupted by frequent sighs; there is great tenderness of the epigastrium, with extreme irritability of the stomach, and vomiting of the ingesta mixed with a glairy fluid. The bowels are confined, and the evacuations often clay-coloured. The urine is occasionally tinged with bile.

After these symptoms have continued, with increasing severity, from a few hours to three days or more, a marked remission takes place, and the symptoms, as well as the sensations of the patient, continue for several hours so much improved as to excite sanguine hopes of recovery. Sometimes the recovery of the patient dates from this remission, but more frequently the improvement is delusive. The febrile symptoms return, accompanied by increased debility; a small and frequent pulse; a cold and clammy skin; a shrinking of the features; a dry tongue, covered with a brown or black fur; increased tenderness of the epigastrium, with an acrid burning sensation extending to the gullet, with extreme irritability of the stomach, and vomiting of all ingesta.

After a further interval of twenty-four or forty-eight hours, and sometimes earlier, the more characteristic symptoms make their appearance. Yellowness of the skin, beginning in the trunk, and

extending rapidly to the whole body; yellowness of the conjunctiva; a feeble, irregular, and intermittent pulse; the tongue and teeth incrusted with black sordes; hæmorrhage from the mouth, ears, nostrils, or bowels, with petechiæ; incessant hiccup; black vomit; and dark and gelatinous stools. In fatal cases, death sometimes happens as early as the third or fourth day, more commonly from the ninth to the eleventh day, and when it goes on into typhus, at a still later period.

Such is the usual course of this disease. But the symptoms are subject to so much variation in different countries, in different epidemics, and even in the same epidemic, that no general description can comprise all the particulars. The following are some of the varieties:—

a. Sudden coma and death in convulsions. *b.* Sudden seizure with black vomit, and death in a few hours. *c.* Intense pain and extreme tenderness in the epigastrium, incessant vomiting, and death from exhaustion. *d.* Great anxiety and restlessness, but with a clean tongue and nearly natural pulse, followed after a time by black vomit and death from exhaustion. Death is sometimes sudden, sometimes the sequel of a quiet sleep, sometimes preceded by acute pain and strong convulsions.

SEQUELÆ.—Organic diseases of the lungs, liver, spleen, or other internal viscera. Obstinate dysentery. Slow and tedious convalescence.

CAUSES—*Predisposing.* Continued hot weather in warm climates. A temperature of not less than from 75° to 80° Fahr. The latter end of summer and beginning of autumn. The climate of the West Indies, of the south of Spain, of the seaports of intertropical America, of Mexico, and of parts of Africa. It occurs more or less frequently, and with greater or less severity, in the West India Islands, at the Havana, at Vera Cruz, at New Orleans, Mobile, Charleston, Baltimore, Philadelphia, and New York, at Gibraltar, and Barcelona. Male sex; intemperance; depressing passions of the mind; all the predisposing causes of common continued fever; especially imprudent exposure to night air. Recent arrival at the place where the disease exists. Want of protection by a previous attack.

Exciting.—Marsh miasmata, and decomposition of vegetable matter on board ship. The disease is of most common occurrence in swamps at the mouths of rivers, in the low-lying parts of crowded cities, and on board of ships laden with vegetable produce, or kept in a damp and filthy state. The type of the disease is sometimes that of a remittent, tending to become continued in the worst cases, and distinctly intermittent in more favourable ones. Contagion?

PERIOD OF INCUBATION.—Less than 10 days.

MORBID APPEARANCES.—General yellowness of the skin, sometimes interspersed with blue or livid spots; the brain and its membranes generally natural in appearance, and rarely presenting any unusual effusion of serum or blood; red, livid, or dark-black spots and patches

on the mucous membrane of the stomach, and its cavity filled with an inky black fluid (black vomit). The intestinal mucous membrane is often of a brown or blackish colour in certain parts, but not ulcerated as in typhus fever, and the intestinal canal contains portions of the same black fluid: the gullet is sometimes found inflamed and abraded; the liver is either greatly congested, or small and anæmic; the bladder is contracted and sometimes inflamed. In some epidemics there has been effusion of blood into the structure of the muscles.

DIAGNOSIS.—In mild cases not always distinguishable from ephemeral or mild continued fever. In severe cases, and in the more advanced stages, it is readily identified by the yellowness of the skin and eye, and the black vomit. The pasty covering, with red tip and border, of the tongue, have been mentioned as characteristic of the disease.

PROGNOSIS.—*Favourable.* A regular and steady pulse, a soft and warm skin, a natural expression of countenance, a moist tongue, a free discharge of urine, a distinct remission, natural sleep of some hours' duration, undisturbed by vomiting, a miliary eruption on the skin.—*Unfavourable.* A robust and plethoric temperament. Previous intemperance. Recent arrival on the spot where the disease is rife. The early occurrence of any of the characteristic symptoms of the disease, as of yellowness of the skin, especially if it occur in patches, or of the black vomit. The existence in an extreme degree of severity, of any of the leading symptoms, as the aching of the eyeballs; the pain in the back; the tenderness in the epigastrium; the acrid burning sensation in the stomach and œsophagus; the incessant vomiting; deep sighing; singultus; collapse; extreme coldness of the surface, with a sensation of internal heat; an irregular or intermittent pulse; and all the symptoms which are regarded as unfavourable in typhus fever. Instances of recovery are recorded, after the appearance of the most unfavourable symptoms, and, on the other hand, "it is known that in persons sitting up in bed amusing themselves, and apparently in a favourable state, the black vomit has suddenly appeared, quickly followed by death, to the utter astonishment of the medical attendants."—*Gillkrest.*

MORTALITY.—Very different in different epidemics. The deaths, in various instances, have amounted to 130 or 131 in 134; 19 in 20; 34 in 35; and 1,265 in 1,739; but they have been as few as 6,684 in 16,517; and even as 1 in 8. English regiments in Gibraltar have suffered a mortality of 1 in 11 and 3 in 11 of the numbers attacked, and in Bermuda of 1 in 3 and 4 in 11. The mortality is generally greatest when the epidemic is recent, and diminishes considerably in the course of time.

TREATMENT.—*Indications.* I. To unload the stomach and insure the free action of the bowels. II. To take advantage of any decided remission. III. To relieve existing symptoms.

I. The stomach should be unloaded at the very commencement of

the attack by an emetic of sulphate of zinc, in the dose of ℈i or ʒss, or of ipecacuanha in the dose of ℈i. The free exhibition of purgatives in this fever is indispensably necessary. They ought to be repeated, and, if necessary, assisted with clysters, until they have produced at least five or six copious evacuations. The thorough evacuation of the whole of the intestinal canal during the first two hours of the fever cannot be too much insisted on.

The best aperient is croton oil, in the dose of one, two, or three drops, repeated if necessary, and administered at intervals, throughout the disease, unless contraindicated by extreme collapse. It may be placed on the tongue, or given suspended in a table-spoonful of mucilage.

A mercurial purgative, consisting of from ten grains to a scruple of calomel, followed in two hours by any saline aperient, or by an ounce of castor-oil, may be substituted for the croton oil.

II. Whenever there is a marked remission of symptoms one large dose of quinine, such as ℈i, should be administered, or a succession of smaller doses, such as two grains every half-hour or every hour.

III. When the *skin* is universally hot and dry, cold affusion, or cold sponging may be used with the very greatest advantage, the cold affusion being preferred at the outset, and in robust persons; sponging with cold water, in the more advanced stage of the malady, and in the debilitated. The application of cold to be repeated as often as the heat of the surface returns. In applying the cold affusion, the patient is to be seated naked over a proper receptacle, and to have water freely poured over him till he feels chilly, when he is to be wiped dry and placed in bed. When, on the contrary, there is great coldness of surface, the warm bath, at a temperature of 100, or more, and warm frictions, should be employed. *Local determination of blood* may be met by cautious local depletion or by counter-irritation. Bleeding from the arm may be resorted to at the outset of the disease in plethoric subjects, or where comatose symptoms are present. The *sickness* may be met by the constant administration of small quantities of arrow-root, or other demulcent fluids, by effervescing draughts, or by ice or ice-water. The *pain in the eyeballs and forehead* may be relieved by local application of cold to the head, the hair having been previously thinned, or the head shaved. *Hæmorrhages* require the use of the mineral acids with bitter infusions; or the acetate of lead, in doses of two grains, with an excess of acetic acid, and from a quarter to half a grain of opium, every two or three hours. *Collapse* must be treated by diffusible stimulants, and by the other remedies applicable to the treatment of the typhoid stage of fever. Extreme *restlessness* in the advanced stages of the disease, and when great debility is present, requires the use of opium in doses of one or two grains, in combination with from five to ten grains of carbonate of ammonia, and from half an ounce to an ounce of camphor mixture: the dose to be repeated every two or three hours, if the patient has improved under the first dose; or the opium may be given with 20 or 30 drops of oil of turpentine, suspended in gruel or barley-water. The diet

should be strictly antiphlogistic at the outset of the disease; but wine should be given as soon as the patient appears to require support.

When the patient is convalescent, tonic infusions, especially the infusion of cusparia or serpentaria, with the dilute sulphuric acid, or the sulphuric, nitric, or chloric ether, or draughts in which quinine forms the chief constituent, should be given three or four times a-day.

℞. Infus. cuspariæ, f ℥viiss.
Spirit. æther. chlorici. Or,
Spirit. ammoniæ aromat. f ℥ss.

Dose two or three table-spoonfuls: or Formulæ 184, 185, 186.

Or,

℞. Quinæ disulphat. ℈i.
Acidi sulph. dil. f ʒi.
Infus. serpentariæ, f ℥vii.
Tinct. lupuli, f ℥i.

Dose two or three table-spoonfuls, or Formula 189.

REMEDIES.—Much difference of opinion has prevailed, and continues to exist, as to the treatment which ought to be adopted in this disease; and a corresponding modification in the treatment here recommended will be found to have taken place. *Bleeding.*—The balance of authority is decidedly against the use of the lancet in this disease, even in robust subjects, and when the inflammatory symptoms seem to run high. *Bleeding, followed by large doses* (℈i *or more*) *of quinine.*—The facts adduced by M. Maillot, who advocated this mode of treatment, would seem to show its superiority to most other modes of treatment. *Mercurial preparations.*—The greatest weight of authority is in favour of the administration of large doses of calomel; for instance, from five to ten grains every two hours, accompanied with mercurial inunction, with a view not merely of unloading the bowels, but of affecting the system. Many authors who have tried this plan agree in stating that, when salivation takes place, the patient is safe: others have found only temporary benefit from its employment; and the facts adduced even by the advocates of this mode of treatment by no means justify their preference. This plan of treatment (if determined upon) should be adopted without delay. Five grains, ten grains, or a scruple of calomel, should be given every two hours, until the gums are affected; or, after the first aperient dose, the smaller quantity of two grains every hour. Mercurial inunction may also be used in severe cases. The calomel should be administered in a small quantity of gruel or arrow-root; but if diarrhœa be present, it should be given in combination with a quarter of a grain of opium in the form of pill or powder. *Emetics* have also been strongly recommended at the outset of the disease. *Saline medicines.*—Dr. Stevens asserts, that saline medicines are the only valuable remedy in this fever. He states that the mortality was immense at Trinidad before his arrival, but never so since. Mr. Hacket, on the other side, denies the efficacy of saline medicines, and *insists* strongly on the superiority of croton oil, which, in spite of the

extreme irritability of the stomach, seems to be easily retained, and to act most beneficially. The *médicine expectante* has also its advocates in this as in other diseases; and much may be said in its favour.

An emetic at the onset of the fever, followed by croton oil as a purgative, and that by calomel in large and repeated doses, with cold affusion in cases of strong vascular excitement, seem to constitute the most important items of the treatment; to be followed as soon as the disease assumes the typhoid type by the treatment appropriate to that state. But much must depend upon the severity of the epidemic, the character of the patient's constitution, and the symptoms present in the individual case. The practitioner must be prepared to encounter fevers of every type and every degree of severity in the same epidemic.

PROPHYLAXIS.—Temperance, a diet containing an excess of vegetable food, cleanliness, regular exercise, the avoidance of exposure to the heat of the sun, or to the night air, cold spongings or the shower-bath in the morning, and a residence, if possible, on a hill or rising-ground, are to be strongly recommended to Europeans in hot climates, especially where yellow fever prevails. Persons of robust and plethoric habit, newly arrived at a place where yellow fever prevails, ought to be especially careful to observe all the rules of health; and they may with advantage keep the bowels open by the regular use of gentle aperient medicines. The sick should be separated from the healthy; and hospitals for the sick should be spacious, cleanly, and well ventilated. Those persons who are able to do so should avoid spots known to be unhealthy, and should take care to remove from them during the unhealthy season. Europeans embarking for tropical climates should make their voyage so as to arrive at the healthy season of the year.

CHAPTER IV.

EXANTHEMATA—ERUPTIVE FEVERS.

DEFINITION.

CONTAGIOUS diseases, attacking a person, for the most part, only once, beginning with fever, and followed, after a short and nearly definite interval, by cutaneous eruptions.

GENERA.

VARIOLA	Small-pox.
VACCINA	Cow-pox.
VARICELLA	Chicken-pox.
RUBEOLA	Measles.
SCARLATINA	Scarlet Fever.
PESTIS	Plague.

VARIOLA—SMALL-POX.

DEFINITION.—A contagious and infectious disease, setting in with severe febrile symptoms, followed by an eruption which passes through the successive forms of pimple, vesicle, and pustule in about the space of eight days.

SPECIES.—1. Variola discreta, distinct small-pox; 2. Variola confluens, confluent small-pox. 3. Varioloid, modified small-pox. Sydenham and Frank have also described a Variola sine eruptione.

1. VARIOLA DISCRETA—DISTINCT SMALL-POX.

SYMPTOMS.—An attack of distinct small-pox is ushered in by rigors, lassitude, headache, severe pains and extreme weakness in the back and loins, nausea, vomiting, pain in the epigastrium upon pressure, drowsiness, and occasionally coma; and in infants, by convulsions or epileptic fits. These symptoms are followed by fever of the inflammatory type, with full frequent pulse, hot and dry skin, diminished secretions, restlessness, and, in some cases, delirium. These symptoms continue up to the period of the eruption, when they generally undergo considerable abatement.

At the end of *forty-eight hours* from the first occurrence of rigors, but sometimes earlier, and sometimes as late as the fourth day, the *eruption* makes its appearance on the face and forehead, in the form

of distinct minute papulæ, about the size of a pin's head, sensibly elevated above the surface of the skin, and feeling like small shot beneath the finger.

During the *third* day, or the *third* and *fourth* days, the eruption extends to the sides of the nose, chin, and upper lip, to the neck and wrists, and at length to the trunk and extremities.

About the *fifth* day, a minute circular vesicle, depressed in the centre, containing a colourless fluid, and surrounded by an inflamed areola or margin, may be seen on the top of each pimple. The eruptive fever now undergoes a still further abatement, or entirely disappears.

About the *sixth* day, the saliva becomes increased in quantity and viscid, and there is some swelling of the throat, with difficulty of swallowing, and hoarseness. These symptoms arise from the extension of inflammation, or of the eruption itself, to the mucous membrane of the mouth and fauces, where it can be seen in the form of small round white spots. The eyelids, prepuce, and labia of the female are similarly affected.

By the *eighth* day, the central depression has disappeared, the areola has attained its full size, and the contents of the vesicles have assumed the appearance of pus. The face swells; and the eyelids often become so enlarged as to close the eyes. The mouth, nose, and fauces are also covered with pustules.

By the *eighth* or *ninth* day of the eruption, the pustules have attained their full size, and are marked by a dark spot at the centre. The inflammatory areola subsides, the tumefaction of the face disappears, and the hands and feet begin to swell.

After this time the pustules break, and discharge their contents; and these drying on the surface, form crusts, which, in a short time, fall off, and leave the skin beneath of a dark-brown colour. This colour often remains for many days. The swelling of the hands and feet gradually subsides, and about the seventeenth day the patient is convalescent. In the more severe cases permanent white scars are left upon the skin of the face, and of the exposed parts of the body.

The period occupied by the change from pimple to pustule is called the period of *maturation*. At different stages of this process, according to the amount of eruption, but generally as early as the eighth day, *secondary fever* sets in, characterised by extreme restlessness, sleepless nights, a frequent and quick pulse, scanty and high-coloured urine, and frequently by delirium, especially at night.

2. VARIOLA CONFLUENS—CONFLUENT SMALL-POX.

SYMPTOMS.—Confluent small-pox differs materially from the distinct form, both in its symptoms and progress. The eruptive fever is more intense, and increases from the first appearance of the rash to the period of pustulation. The *secondary fever* is also more severe, and often assumes the typhoid character. Coma and delirium are more frequent concomitants; and severe diarrhœa sometimes sets in.

The eruption is also irregular in its appearance and progress. It is usually preceded by a red efflorescence upon the face, from which the pustules emerge on the second day in the form of small red points; which soon coalesce into clusters with pale and flaccid interspaces, resembling those of measles. Maturation takes place earlier; but the pustules, instead of being globular, are flattened and irregular in shape, and sometimes contain, instead of pus, a brownish ichor. The inflammation extends to the subjacent cellular membrane, and sometimes ends in extensive sloughing. The swelling of the face and salivation commence early, and rise to a great height. The fever, though it generally undergoes a slight remission, does not cease, upon the appearance of the rash; and about the ninth day it suffers a remarkable exacerbation, and in some instances all the worst symptoms of typhoid fever supervene. The eruption assumes a dark livid or black hue; petechiæ, and passive hæmorrhages, bloody urine or dysentery, make their appearance; there are coma, convulsions, and sordes on the lips and teeth, and the patient is often carried off on the night of the eleventh day from the commencement of the disease. In cases of recovery, the pits or scars are much deeper and more extensive than in the milder form.

3. VARIOLOID—MODIFIED SMALL-POX.

Small-pox admits of being greatly modified in its severity, and otherwise changed in character by three causes:—*a*. Inoculation. *b*. Vaccination. *c*. A previous attack of the disease.

Symptoms.—Inoculated small-pox has now lost much of the interest that formerly attached to it; but a brief description of its phenomena is desirable. On the second day after the operation an orange-coloured stain shows itself round the incision. On the fourth or fifth day, the skin is hard and inflamed, and a vesicle appears. About the sixth day some pain and stiffness is felt in the axilla. On the seventh day, a red areola forms round the vesicle, which is enlarged. On the seventh, eighth, or ninth day, the primary fever sets in, and after lasting three or four days, the 'secondary eruption' appears in three distinct crops, on the face, neck, and upper extremities, then on the trunk, and lastly on the lower extremities. The 'primary pustule' runs a more rapid course than the secondary eruption. The fever throughout is very mild, the pustules few—from ten to two hundred—and the mortality very slight (probably about one per cent.).

Small-pox modified by a previous attack of the disease, or by vaccination, also differs in several respects from the disease as it occurs in unprotected persons. The principal points of distinction are the following:—The eruptive fever, though often extremely intense, generally continues during only one day. The patient often complains of some indisposition in the afternoon, passes an extremely restless night, and finds the eruption out in the morning. The first places in which it makes its appearance are generally the wrist and alæ of the nose. A pimple appearing in the latter situation, will often give the first clue to the nature of the disease. The eruption itself

runs a shorter course, is rarely confluent, and presents none of the uniformity of the regular disease. A few of the pustules, though small, are regularly formed, and present the central depression. Several of the pimples do not pass to the form of vesicle, and the vesicles themselves shrivel, and dry up (*Horn-pock*), or the vesicles are unusually persistent, and from their transparent appearance are called *Pearl-pock*. All the stages of the eruption may be seen on the body at the same time, and all of them imperfect. As soon as the eruption appears, the patient is well, unless it happen to be sufficiently extensive to give rise to secondary fever.

CAUSE.—A specific contagion, emanating from persons labouring under the disease, or from clothes or other articles worn or used by them; or by the application of the scab, or the introduction of the variolous matter into the system by inoculation.

PROGNOSIS.—*Favourable.* The pustules distinct; the march of the disease regular; the subject healthy. The period of childhood and youth. The modified form of the disease.

Unfavourable. The confluent form of the disease; the fever assuming the typhoid form, and the pustules becoming flattened, livid, or interspersed with petechiæ. The sudden disappearance of the rash, with subsidence of the swelling of the face or extremities, and depression of the pustules, followed by great prostration of strength, universal pallor of the skin, great anxiety, oppression at the chest, syncope, convulsions, coma, or delirium. A sudden increase of frequency in the pulse. Complications with visceral disease, such as inflammatory affections of the brain, of the throat, larynx, or lungs, or of the alimentary canal, and suppurations in these viscera, or in the joints. Infancy, and advanced age.

In general, the fate of the patient is determined in the interval between the eleventh and seventeenth day, but death may take place during the primary fever. The crisis of the secondary fever is usually accompanied with a diarrhœa, or sediment in the urine.

SEQUELÆ.—Abscesses, ulcers, boils, suppuration of the glands of the neck, sloughing of the skin, erysipelas, suppuration of the joints, and permanent lameness; ophthalmia, followed by blindness from opacity of the cornea; deafness, following suppuration of the internal ear; suffocation, from swelling of the glottis; inflammation of the serous membranes of the chest and abdomen; pleurisy, terminating in empyema; inflammation of the lungs; hæmoptysis; hæmaturia, inflammation and suppuration of the kidneys; in females, menorrhagia; in pregnant females, abortion. During the period of convalescence, patients are often attacked with other prevalent diseases, such as typhus fever, erysipelas, and hospital gangrene.

POST-MORTEM APPEARANCES.—On the skin, the eruption already described. On the conjunctiva of the eye, and on the lining membrane of the air-passages, on the mouth, tongue, nostrils, palate, and fauces,

on the prepuce, and on the labia of the female, small patches of false membrane, or of detached epithelium, or denuded spots of mucous membrane, or actual pustules. In rare cases, these appearances extend into the bronchial tubes and through the whole length of the intestines. There are traces of local inflammation in various internal organs; the texture of the viscera is often softened, and the entire body runs rapidly into putrefaction.

DIAGNOSIS.—Difficult at the commencement of the disease. The suddenness of the attack, the intense pain in the head, back, and loins, the sickness, the absence of the local affections of the other severe exanthemata, the prevalence of the disease at the time, and the exposure to contagion, afford a probability in favour of small-pox. The regular succession of appearances, and of changes in the eruption, afterwards render the distinction easy.

In the early stage of the eruption, the papulæ on the alæ of the nose and upper lip give an appearance to the countenance which is highly characteristic. It is sometimes difficult to distinguish the papular stage of the eruption of small-pox from an acute attack of syphilitic lichen; and it may be necessary to speak with caution till the disease is farther advanced.

The distinct may be often distinguished from the confluent, before the eruption appears, by the mildness of its attack, and by the favourable type of the fever.

The modified form is characterised by the short duration of the eruptive fever, by the absence (except in extreme cases) of the secondary fever, and by the rapid progress and irregular character of the eruption.

MORTALITY.—The deaths in the metropolis, in a million persons living, vary from 90 to 900, and average 400. The number of deaths has been greatly influenced by legislation. *Rate of mortality*:—In those unprotected by vaccination or by previous attack, about 1 in 4. Average of twenty-five years at the Small-pox Hospital prior to the introduction of vaccination, 32 per cent., or about one-third; extremes in different epidemics 15 per cent. and 42 per cent. *Proportion to total deaths from all causes* prior to 1800, 16 per cent. *Comparative mortality of the unprotected and of those protected by vaccination.*—Period, the epidemic of 1838. Unprotected (all forms of the disease), 157 in 396, or 1 in 2·52; protected, 31 in 298, or 1 in 9·61. The natural small-pox, therefore, is nearly four times as fatal as the modified.—(Dr. Gregory.) *Mortality in the several forms of natural small-pox.*—Confluent 1 in 2; semi-confluent, 1 in 10; distinct, 0 in 19. *Influence of age on the mortality from small-pox.*—From 0—5 years, 42 per cent.; 5—10, 24 per cent.; 10—15, 19 per cent.; 15—20, 24 per cent.; 20—30, 34 per cent.; 30—40, 46½ per cent.; 40—50, 58 per cent.; 50 and upwards, 79 per cent. (Dr. W. Farr. Period, 1780—99, and 1826—35.)

LAWS OF INFECTION.—Communicated by contact or through the air, by the living and dead body; by the contents of the vesicles and

pustules; by the dried scabs; or by substances imbued with the variolous matter. Infecting distance considerable—from 30 to 50 feet, or more. The period at which a patient begins to be able to communicate the affection, and at which he ceases to be dangerous to others, has not been ascertained. Rarely occurs twice in the same person: about one per cent. being believed to be liable to a second attack. May attack the fœtus in utero. *Period of incubation.*—Usual duration, twelve days; limits, ten to sixteen days. Epidemic at certain seasons, as in 1781, 1796, 1825, 1838, 1840, 1844, and 1848. Annual fluctuation considerable, *e. g.* in 15 years (from 1840 to 1854 inclusive), the number of deaths in London, in a million inhabitants, was as high as 890 in 1844, and as low as 225 in the year preceding, and only 87 in 1853. This fluctuation is in part the effect of recent legislation.

TREATMENT.—*Before the appearance of the eruptive fever,* the treatment will be the same whatever may be the nature of the impending disease. An emetic (Pulv. ipecac. ℈i.; Antim. pot. tart. gr. i.), followed by a brisk saline aperient (Magnes. sulph. ℥ss.; Infus. sennæ c. f ℥iss.; Tinct. sennæ f ℥ss.), to remove any offending matter from the primæ viæ; bleeding in the plethoric; the antiphlogistic regimen, if inflammatory symptoms run high; stimulants in extreme nervous depression; opium in great nervous irritability; bleeding and stimulants in congestion, in order to restore reaction, and to relieve the circulation.

2. *During the eruptive fever,* when this is of the inflammatory kind, the febrile symptoms, if considerable, are to be moderated by exposing the body of the patient to a cool atmosphere, by frequently administering cold diluent fluids, as lemonade, imperial, saline draughts, &c.; at the same time administering saline aperients, so as to keep the bowels loose. Cold affusion may also be employed with advantage when there is much heat of skin; but cold or tepid sponging, limited to the hands and arms, is to be preferred.

3. *After the appearance of the eruption,* the indications are:

I. To moderate the fever when violent.

II. To support the strength when deficient.

III. To subdue local inflammation and relieve occasional symptoms.

I. In full and plethoric habits, and in cases of violent action, bleeding has been recommended, but it should be avoided if possible; for the subsequent debility generally overbalances the temporary advantage that may be gained by this remedy. In place of bleeding, mercurial and saline aperients, tartar emetic in doses proportioned to the amount of fever present, the antiphlogistic regimen, and free ventilation of the patient's apartment, should be prescribed.

II. When the patient's strength fails, he must be supported by tonics or stimulants, according to the degree of the existing debility. Quinine, or the tonic infusions, may be prescribed in the lesser degrees of weakness, wine and ammonia when the debility is more considerable. If with the debility there is great irritability and restlessness, opium

in small quantities, cautiously increased, or laudanum may be combined with the tonic or stimulant.

III. When the eyelids swell much, and are inflamed, a blister may be applied behind the ears, or leeches to the temples. In such cases, and when the face is swollen, olive-oil or cream is often applied to the surface with advantage.

If the throat is much affected, and there is difficulty in swallowing, a blister is to be applied to the neck, and gargles of infusion of roses directed.

Determination to the head or chest, or other viscera, requires blisters, the pediluvium, sinapisms to the feet, and the ordinary remedies applicable to idiopathic inflammation of the same parts.

Obstinate vomiting, which in this disease often proves both a troublesome and dangerous symptom, is most effectually allayed by saline remedies, in the act of effervescence, with laudanum. If there is tenderness at the epigastrium, a warm bread-and-water poultice may be applied, preceded, in severe cases, by a few leeches.

If the febrile symptoms indicate a typhoid tendency, the mode of treatment recommended in that form of continued fever should be resorted to.

If after the eruptive fever has passed away, the patient suffers from profuse sweats, a cool regimen, and the dilute mineral acids in combination with tonics (Acid. sulph. dil. ℥xx; Infus. quassiæ, f ℥i; Tinct. lupuli, f ℥ss.) should be given three or four times in the day.

Diarrhœa, when excessive, is to be checked by small doses of laudanum (three, four, or five drops), with chalk mixture, or by the Pulvis cretæ co. c. Opio, in doses of ten grains, or a scruple, three times a-day.

When the eruption suddenly recedes, or the pocks sink and become very much dimpled, and any alarming symptoms supervene,—as rigors, convulsions, or delirium,—recourse must be had to depletion and counter-irritants; leeches to the temples, blisters to the nape of the neck, and sinapisms to the feet and legs. The cold dash applied to the head whilst the body is in a warm or vapour-bath, may be used with great benefit.

4. *The secondary fever* requires the treatment of continued fever of the same type and degree of severity. When much irritation is present full doses of opium are indicated; and in extreme cases a small bleeding from the arm, followed by full doses of opium.

In favourable cases of modified small-pox but little treatment is required beyond the administration of an occasional saline aperient, and the avoidance of excess in diet.

In all cases of small-pox the warm bath should be used repeatedly during the stage of convalescence.

Prevention of pitting.—Several plans have been recommended for preventing the pitting of small-pox. All of them consist either (1) in protecting the parts from the air; or (2) in letting out the contents

of the vesicles before they have changed from lymph to pus; or (3) in exciting common, in lieu of specific, inflammation.

1. Mercurial plasters, or an ointment consisting of equal parts of mercurial ointment, powdered starch, and the common sulphur ointment, have been applied with advantage in the early stage of the eruption. These applications should be smeared over the face in males, and the face, neck, and arms in females. Collodion has been used for the same purpose.

2. Puncturing the vesicles as soon as they are fully developed, with a fine needle, and absorbing their contents with soft cotton, is a very effectual method; but it is very tedious.

3. Nitrate of silver in substance, or in strong solution, applied to the pustules is also advantageous. Tincture of iodine has been substituted for the solution of lunar-caustic, and with benefit.

VACCINA—COW-POX.

SYNONYMS.—Vacciola, vaccinia, kine-pox, vaccine disease.

The benefits conferred on mankind by the discovery of vaccination, as a preventive of small-pox, are now universally admitted. If the virus be genuine and properly inserted, the body is, to a certain extent, protected from the attacks of small-pox, and the disease, if it occur, is in most cases greatly mitigated. The protection seems, however, to be less effectual during severe epidemics, when the power of the contagion is at its height; and the mortality of the protected seems to be increased when they are treated in hospitals for the cure of small-pox.

MODE OF PERFORMING THE OPERATION.

Three or four punctures should be made near each other, in one arm, or in both arms, about the insertion of the deltoid muscle. The skin being made tense, a sharp lancet should be inserted obliquely downwards under the skin, so as to draw a single drop of blood. If the matter is taken from the arm of another child, the lancet should be dipped in the lymph of the vesicle, and then inserted in the punctures. If the matter is on slips of glass, or on points, it must be first moistened by the breath.

DESCRIPTION OF THE AREOLA.

If the operation has been properly performed, the course of the eruption is somewhat as follows:—

Second day.—Small red spots appear which feel hard, but, when viewed under the microscope, are seen to be vesicular.

Third or fourth day.—The spots are larger and more perceptible.

Fifth day.—Small pearly circular or oval vesicles appear corresponding to the punctures, and containing a minute quantity of transparent fluid.

Eighth day.—The vesicle has attained its perfect form and full size, with depressed surface and raised margin. On the evening of this day the vesicle begins to be surrounded by a circular rosy areola, and the skin for some distance around it is tense and painful. There is also slight febrile disturbance.

Ninth and tenth days.—The areola increases, and is often accompanied by extensive erythema of the arm, and sometimes by a lichenous eruption of the whole body.

Eleventh day.—By this time the vesicle, if it have not been opened, has burst, the areola has begun to fade, the centre of the vesicle is covered with a brown scab, which first hardens and blackens, and about the *twentieth* day falls off, leaving a deep mark, or indentation on the skin, of a circular form, with as many pits as there were cells in the vesicle, and proportioned in size to the previous inflammation. Unless all these appearances are observed, a spurious cow-pox has been communicated, and re-vaccination is absolutely necessary.

The best time for taking the matter is from the fifth to the eighth day, and from that to the twelfth, but after this time it cannot be depended on; or if any cause, such as friction or injury, has disturbed the progress of the vesicle. The disease will not be properly communicated should there be a chronic eruption on the arms; if scarlatina, measles, or other cutaneous diseases supervene; or if dentition, disordered bowels, or any other malady be present. Sometimes boils, pustules, and leprous and impetiginous eruptions, succeed the vaccine disease; but this seldom happens when the child's health is good at the time of vaccination. Such eruptions are readily cured by mercurial alteratives and gentle aperients.

Infants may be vaccinated at any time after the sixth week. The age of three months is to be preferred, if the child be healthy.

Some have recommended the repetition of vaccination at intervals of a few years. This is a wise precaution, justified by experience, and if adopted, should be performed a second time at about ten years of age, or from this to the age of puberty. As it may be practised without inconvenience, it may be well to resort to it in epidemic years, whenever we are unusually anxious to insure protection against small-pox, or to allay the fears of timid persons.

The best argument for re-vaccination is founded on the result of that operation in the Prussian army. In the year 1841 nearly 45,000 soldiers were re-vaccinated, and though before that time varioloid disease was very prevalent in the barracks, only eight cases occurred after re-vaccination.

As it is highly important that the amount of protection afforded by vaccination should be understood, the following tables have been constructed:—

EPIDEMIC IN SCOTLAND, 1818–1819. DR. JOHN THOMPSON.

	Unprotected.	Small-pox second time.	Small-pox after Vaccination.
Cases . . .	205	71	310
Deaths . . .	50	3	1
Proportion . .	1 in 4	1 in 23	1 in 310

The following table, reduced to a uniform scale of 15,000, is founded on the facts recorded by M. Favart during an epidemic of small-pox which took place at Marseilles in 1828. The estimated population under 30 years of age was 40,000, of whom 30,000 had been vaccinated, 2,000 had had casual small-pox, or small-pox by inoculation, and 8,000 were unprotected. The inference to be drawn from these facts is, that vaccination, though a less complete protection against attacks of small-pox than inoculation or a previous attack of the disease, is the best existing protection against a fatal attack:—

MARSEILLES.—EPIDEMIC OF 1828.—ESTIMATED POPULATION, 40,000.

	Unprotected.	Previous Small-pox or Inoculated.	Vaccinated.
Estimated number . .	15,000	15,000	15,000
Attacked	7,500	150	1,000
Died	1,875	30	10
Proportion of attacks to estimated number .	1 in 2	1 in 100	1 in 15
Proportion of deaths to attacks	1 in 4	1 in 5	1 in 100

From a tabular statement appended to a paper, read by Dr. Gregory before the Medico-Chirurgical Society of London, March 9, 1852, it appears that in the Small-pox Hospital, during the 11 years 1841–1851, there were 4,091 admissions with small-pox, distributed as follows:—

		Deaths.	Mortality per cent.
Persons not alleging any protection .	1,722	629	37
,, alleging prior small-pox .	36	6	17
,, ,, vaccination, but showing no scars	166	56	34
,, ,, vaccination, and having scars .	2,167	147	7

(See Med. Times and Gazette, June 26, 1852.)

Dr. Gregory (Libr. of Med., vol. i. p. 323) expresses an opinion "that all idea of banishing small-pox from the earth is vain and illusory." The facts which he adduces do not bear out this view of the case; and where vaccination has been extended for a term of years to an entire population, without exception, there is evidence that small-pox has disappeared. (See Sir Gilbert Blane's Essay on Vaccination, and Baron's Life of Jenner.)

VARICELLA—THE CHICKEN-POX.

DEFINITION.—A contagious and infectious disease ushered in with slight febrile symptoms, followed by a vesicular eruption which generally runs its course in five days.

SYNONYMS.—Swine-pox, Bastard-pox, Gland-pox, Crystalli.

SYMPTOMS.—Within twenty-four hours after slight symptoms of fever, such as lassitude, loss of sleep, wandering pains, and loss of appetite, an eruption appears; first on the back, consisting of small reddish pimples, much resembling the first appearance of the small-pox. On the *second* day, the red pimples have become small vesicles, containing a colourless fluid, and sometimes a yellowish transparent liquor. On the *third*, the vesicles arrive at maturity. Soon after, the fluid becomes extravasated by spontaneous or accidental rupture of the tender vesicle, and a thin scab is formed, but no pus, as in variola. Generally before the *fifth* day the whole eruption disappears, without leaving behind it any cicatrix or mark.

CAUSE.—*Predisposing*. Infancy and childhood.—*Exciting*. Contagion.

DIAGNOSIS.—*From variola*. By the slight fever; by the short interval (24 hours) between the first symptoms and the appearance of the eruption; by the pimples first appearing on the back; by the absence of suppuration and of indentation; by the falling off, in scales, about the fifth day; at which period the eruption in variola is only just completed. From modified small-pox, by the absence of pits in all the vesicles.

PROGNOSIS.—Highly favourable.

LAWS OF INFECTION.—Communicated by contagion, inoculation, and fomites, and through the air. The infection less powerful than that of the other febrile exanthemata, and the infecting distance probably inconsiderable. The disease, as a general rule, affects the system only once. The latent period is probably considerable.

TREATMENT.—This complaint is so trivial as seldom to require the aid of medicine. Gentle saline aperients may be prescribed, combined with small doses of tartar-emetic, if the fever should happen to exceed its usual moderate standard. The treatment may be terminated by a a warm bath.

RUBEOLA—THE MEASLES.

DEFINITION.—A continued contagious and infectious fever, commencing with catarrhal symptoms, and followed, about the fourth day, by a peculiar eruption on the skin.

SYNONYM.—Morbilli.

SPECIES.—1. Rubeola vulgaris; 2. Rubeola maligna; 3. Rubeola sine catarrho.

1. RUBEOLA VULGARIS.

SYNONYMS.—Morbilli vulgares; Morbilli mitiores.

SYMPTOMS.—The premonitory symptoms resemble an attack of catarrh. After rigors and flushes, lassitude, heaviness, pain in the head and drowsiness, there are ringing cough; hoarseness; difficulty of breathing; frequent sneezing; itching of the face; smarting of the eyes, swelling of the eyelids, with copious secretion of watery fluids from the eyes and nostrils; nausea or vomiting, thirst, furred tongue, frequent pulse, and the general symptoms of fever.

On the *fourth*, but sometimes as early as the third, or as late as the fifth, day, small red circular spots, resembling flea-bites, appear, first on the face, neck, and upper extremities, then on the trunk, and afterwards on the lower extremities. The three crops of the eruption are commonly separated by an interval of twenty-four hours. The spots are generally in crescentic clusters, of a deep-red colour, do not rise into visible pimples, but are found by the touch to project slightly above the surface. Sometimes, however, the spots are distinctly papular, and, at the height of the eruption, vesicular.

About the *eighth* day, but sometimes as early as the *fifth* or *sixth*, the colour of the rash begins to fade: first upon the face, neck, and arms, then upon the trunk, and lastly on the legs; and, in a day or two more, the eruption entirely disappears, with a mealy or furfuraceous desquamation of the cuticle. At this period diarrhœa sometimes sets in. The fever and catarrhal symptoms subside at the same time, and the expectoration changes from a transparent mucus to an opaque-whitish or yellowish-white sputum.

The catarrhal and febrile symptoms sometimes subside on the appearance of the rash; but in the majority of cases they increase, and are attended with much anxiety and oppression of the præcordia, and symptoms of pneumonia.

The usual duration of the disease is from nine to twelve days.

2. RUBEOLA MALIGNA.

SYNONYMS.—Morbilli graviores. Morbilli nigri.

This form of the disease is ushered in by more severe premonitory symptoms, and soon assumes the typhoid character. The eruption appears early, but irregularly, alternately receding and reappearing. It assumes a dark or livid hue (*rubeola nigra*), and is often interspersed with petechiæ. The fauces often assume a dusky-red or livid hue; all the symptoms are aggravated; there is great tenderness in the abdomen, with dark offensive stools; delirium is present, or coma, or convulsions; and the affection of the mucous membrane of the air-passages passes into croup or severe pneumonia. The patient dies exhausted by diarrhœa, or asphyxiated by the congestion of the lungs, or comatose from the severity of the head-affection.

3. RUBEOLA SINE CATARRHO.

In rare instances the primary fever and eruption of measles show themselves in a mild form, without the accompanying catarrhal symptoms. On the other hand, cases are believed to occur in which a fever, resembling in character and duration that of measles, takes place with catarrhal symptoms, but without the cutaneous eruption.

CAUSE.—*Predisposing.* The period of infancy and childhood; but the disease may occur at any age. The seasons of winter and spring. —*Exciting.* A specific contagion, of which patients are generally susceptible only once during their lives.

MORTALITY.—The number of deaths in the metropolis in a million persons living varies from 250 to 1,120, and averages 575.—*Rate of mortality.* This varies in different epidemics from 1 in 3 to 1 in 40, the average being 1 in 15.

LAWS OF INFECTION.—The disease spreads from person to person, by fomites, and through the air; it may also be communicated by blood from the arm, or by serum from the vesicles mixed with the rash. The disease very rarely occurs a second time. Its period of incubation is believed to be from 6 to 16 days; and there is reason to think that the disease may be communicated during the primary fever. Epidemic in certain seasons, as in 1845 and 1847. Annual fluctuation considerable: *e. g.*, 1,122 deaths in London in one million inhabitants in 1845, and only 249 deaths in 1852.

DIAGNOSIS.—From *Scarlatina* by the darker hue of the rash, the crescentic arrangement of the patches, and its appearance, as a general rule, on or about the fourth, instead of the second day. Also by the marked catarrhal symptoms, and the absence of the severe affection of the throat; by its shorter course; and by its less fatal character. From *Roseola*, by the catarrhal symptoms; by the darker hue and more sudden appearance of the eruption; and by the greater severity of the symptoms.

PROGNOSIS.—Generally favourable, unless in the form of Rubeola Maligna. *Favourable Symptoms.* The febrile and other symptoms slight; moderate diarrhœa; epistaxis; early and free expectoration; a moisture on the skin at the appearance of the eruption.—*Unfavourable.* A high degree of fever; hot and parched skin; hurried and difficult breathing; flushed countenance; unusually hard pulse. The fever increasing after the appearance of the rash, and assuming the form of hectic, or of typhus; great pain in the head and eyes; shooting pains in the chest; symptoms of pneumonia or cynanche; convulsions; the pulse rapid and small; coexistence with hooping-cough; delirium, or coma; extremely anxious respiration; continued diarrhœa or vomiting. The sudden disappearance of the rash, succeeded by delirium, great anxiety, laborious respiration, acute pains in the chest, or violent diarrhœa; the eruption assuming a livid hue.

SEQUELÆ.—Pneumonia, œdema of the lungs, pleurisy, cynanche trachealis, bronchitis, phthisis; diarrhœa, enlargement of the mesenteric glands; ophthalmia, abscesses in the ear, swelling and suppuration of the parotids; aphthæ and gangrene of the mucous membrane of the mouth.

POST-MORTEM APPEARANCES.—Marks of inflammation in the internal organs, especially of the air-passages and lungs.

TREATMENT.

Of the Rubeola Vulgaris.

Indications.—I. To diminish inflammatory action. II. To relieve urgent symptoms.

I. The first indication is fulfilled by abstinence from animal food and strict adherence to the antiphlogistic diet; by placing the patient in a moderately-cool atmosphere, carefully guarding against exposure to cold; by the occasional exhibition of saline aperients, and by the common refrigerants and diaphoretics, of which ipecacuanha or tartar-emetic, in small doses, is the best.

When the febrile symptoms run high, and more especially when there is a threatening of local inflammation, tartar-emetic must be given in nauseating doses, at short intervals.

II. If inflammation of the lungs or larynx supervenes, leeches must be applied to the chest or neck, in number proportioned to the age of the patient and the severity of the attack. The patient should then be placed in a warm bath, and nauseating doses of tartar-emetic should be given every two, three, or four hours. A bread-and-water poultice may also be applied over the sternum, but blisters should be avoided.

Hoarseness, cough, and inflammation of the fauces will be palliated by barley-water, with acacia gum, by thin arrowroot, or by the compound decoction of barley, taken frequently in small quantities, with the chill removed. The addition of a little nitre, or of a small quantity of lemon-juice, will render these drinks more palatable. Inhaling the steam of warm water is also serviceable.

Mild opiates are sometimes useful after the febrile action is abated. An opiate, given at bedtime, should be combined with a saline diaphoretic, as in Dover's powder. Tincture of opium should be given in combination with the liq. ammon. acetatis.

Diarrhœa may be treated by the compound chalk and opium powder three or four times a-day, the dose of the powder being increased, and emollient clysters being administered from time to time, if the diarrhœa becomes troublesome. The more powerful astringent remedies recommended in the treatment of diarrhœa (see *Diarrhœa*) should be reserved till this more simple treatment has failed.

When diarrhœa does not take place spontaneously, the bowels must be relieved by some simple saline aperient.

Of the Rubeola Maligna.

The treatment of malignant measles is similar to that of the typhoid stage of continued fever; it requires the exhibition of mineral acids, quinine, wine, and ammonia, according to the degree of exhaustion.

When the eruption of measles disappears before the proper period, and convulsions, great anxiety, or delirium take place, the indication will be to restore the eruption to the skin. To effect this, recourse must immediately be had to the warm bath, blisters or sinapisms to the chest and feet, the administration of warm wine and water, ammonia, camphor, æther, or other appropriate stimulants. The liquor ammoniæ acetatis, in doses of from ʒi to ℥ss, according to the age, may be administered at short intervals.

During convalescence, the diet should be nutritious, the bowels regulated, and the dress warm. Great care should be taken to avoid exposure to cold.

PROPHYLAXIS.—The same precautions are required to prevent the spread of the contagion, as in other contagious maladies. Inoculation with blood taken from the patches, with the serum of the vesicles, when the eruption is vesicular, or with the secretion of the conjunctiva, has been practised with some advantage. The cases of the disease which have followed inoculation have been mild and favourable.

SCARLATINA—SCARLET FEVER.

DEFINITION.—A continued contagious and infectious fever, accompanied by inflammation of the fauces, and by a scarlet eruption on the skin, setting in on or about the second day, and terminating in desquamation of the cuticle.

SPECIES.—1. Scarlatina simplex; 2. Scarlatina anginosa; 3. Scarlatina maligna; 4. Scarlatina sine eruptione.*

1. SCARLATINA SIMPLEX.

SYNONYM.—Scarlatina sine angina. Scarlatina mitis.

SYMPTOMS.—This disease is characterised by the slight affection of the throat. It sets in with the usual premonitory symptoms of fever—viz., cold chills, shivering, nausea, and sometimes vomiting, with pain in the head, back, and limbs, thirst, hot skin, frequent pulse, restlessness, and sleeplessness. On the *second* day, in the greater number of cases, a bright scarlet efflorescence is perceptible on the face, neck, and arms, whence it extends over the trunk and limbs.

* It may be well to state that it is now usual for medical men, with a view to satisfy the minds of their patients, to designate mild cases as *scarlatina*, and severe cases as *scarlet fever*.

At first it consists of innumerable red spots, separated by interstices of the natural colour: these spots soon coalesce, so that in a few hours the redness becomes universal; but it is peculiarly distinct at the tends of the joints, on the chest and abdomen, the hips and loins. The skin is rendered pale by pressure, but the colour immediately returns. After the lapse of *one* or *two* days, the efflorescence again becomes partial, is arranged in large irregular patches, and does not disappear on pressure. The skin is perceptibly rough to the touch, and in some instances it is studded with small miliary vesicles. The rash generally begins to decline on the *fifth* day, is very indistinct on the *sixth*, and wholly disappears by the *eighth* day. Desquamation of the cuticle generally begins on the parts first affected about the end of the *fifth* day, and soon extends to the entire body. The cuticle separates as a scurf from the trunk and limbs, and in large scales from the hands and feet. The desquamation is often accompanied by great itching, irritation, and tenderness of the skin.

The eruption is preceded or accompanied by a sore throat, and some difficulty of swallowing; and, on inspection, the tonsils are found slightly enlarged and inflamed, and coated with a white tenacious mucus. The eyelids, lips, edges of the tongue, soft palate, pharynx and nostrils, are also of a red colour. The papillæ of the tongue are elongated, and project as bright-red points through the white mucus which covers its surface; or the whole tongue is of a bright-red colour with prominent papillæ. The tongue in the first case resembles a white strawberry; in the second a red one.

The fever does not abate on the appearance of the rash, but subsides with it, leaving, in most cases, great debility behind it. The pulse is generally very frequent (120 or 130), and the skin very hot (105°, 106°, and even 112° Fahrenheit). There is generally some increase of fever at night, with slight delirium, even in favourable cases. The bowels are frequently confined, and nausea and vomiting are not of very uncommon occurrence. The urine is often scanty and high coloured, and, in the decline of the disease, is generally found to contain albumen.

Although the eruption in scarlet fever usually occurs on the second day, there are many exceptions to the rule. On the one hand there are cases in which the rash appears much earlier than the second day, as in a lad of sixteen, who felt ill for the first time at five o'clock in the evening, and had the eruption full out upon him before twelve o'clock at night. On the other hand, during the prevalence of scarlet fever, cases are constantly occurring in which there is slight sore throat, and a suspicious appearance of tongue, with little disturbance of health for three, four, or five days, at the end of which time the eruption makes its appearance, and the disease generally runs a mild course. These cases present some difficulty; but however slight the other symptoms may be, there is always during this latent period a very frequent, full, and peculiarly compressible pulse. Whenever this pulse exists, some febrile disease (and scarlatina if rife at the time) may be confidently looked for. (G.)

2. SCARLATINA ANGINOSA.

SYNONYM.—Fothergill's sore throat. Scarlatina mitior.

SYMPTOMS.—Those of scarlatina simplex, but in an aggravated form, with a more severe affection of the throat and parts adjacent.

The submaxillary glands are enlarged and painful to the touch; the soft palate, uvula, tonsils, and pharynx, as far as the eye can reach, are of a florid red colour, the tonsils soft, palate much swollen, and the uvula enlarged and lengthened. A thick mucus collects at the back of the throat, and proves very troublesome to the patient, and specks are often observed resembling the sloughs in cynanche maligna; yet ulceration seldom takes place, and when it does occur, is superficial. The mouth is opened with difficulty, there is great pain in swallowing, and liquids often return through the nostrils. The tongue is very red, and the papillæ are very distinct. The inflammation may also extend to the mucous membrane of the nose, and through the Eustachian tube to the ears, followed by purulent discharge from those parts. The skin is of a deeper colour, and the eruption spreads more rapidly over the surface.

Not unfrequently, after a few days' amendment, an unaccountable langour and debility supervene; the pulse is accelerated; the sleep is disturbed; the appetite is lost; the secretion of urine is nearly suppressed; and dropsical effusions take place into the limbs, abdomen, or chest, or in several parts of the body at the same time.

3. SCARLATINA MALIGNA.

SYNONYM.—Scarlatina gravior.

SYMPTOMS.—The tonsils, though less swollen than in scarlatina anginosa, are of a deeper red colour, and soon become the seat of rapid, extensive, and deep ulcers, interspersed with dark sloughs, which are detached slowly, leaving deep ragged sores, which heal with difficulty. Aphthous ulcers also form on the interior of the cheek. The inflammation, extending into the nostrils, causes a thin corrosive discharge which excoriates the lip and inflames the parts with which it comes in contact, and the salivary glands are much swollen and inflamed. The eruption appears late, in irregular patches of a paler colour, which sometimes disappear suddenly. The other symptoms are those of the typhoid form of continued fever.

4. SCARLATINA SINE ERUPTIONE.

SYNONYM.—Scarlatina latens.

It is not uncommon for those who have had scarlet fever in its usual form, when again exposed to the contagion to have the characteristic sore throat succeeding the usual premonitory symptoms, but no eruption. Desquamation of the cuticle, however, occurs in some of these cases, where no distinct rash has appeared on the skin.

There is good reason to believe that such persons are capable of communicating the common type of the disease to others.

DURATION OF SCARLET FEVER.—In cases of ordinary severity, the first stage (from the commencement to the appearance of the rash) twenty-four, forty-eight, or seventy-two hours; the second stage (from the appearance of the rash to its subsidence) from six to eight days, and the third stage (from the disappearance of the rash till the recovery of the patient) from a few days to two or three weeks. Entire duration of the disease from eight days to thirty days, or more.

SEQUELÆ.—Acute desquamative nephritis, with anasarca, and occasionally with other dropsical affections, such as ascites, hydrothorax, hydrocephalus, and hydropericardium. These diseases often follow the mildest attacks. The other sequelæ show themselves mostly after attacks of scarlatina anginosa or maligna. They are the following:—Pain and swelling of the larger joints, with formation of serum, or pus; scrofulous affections; discharge from the nostrils; discharge from the ears, and permanent deafness; suppuration of the glands of the neck; troublesome ulcers of the tongue, pharynx, or epiglottis; croup; inflammation of the eyes and eyelids; inflammatory affections of the internal viscera or of their serous investments; abscess of the testis; mortification of the face, lower extremities, and the pudenda of females; also of portions of the integuments on which the patient has lain; troublesome diarrhœa.

TERMINATIONS.—In complete recovery. In complete recovery after one or more of the foregoing sequelæ. In imperfect recovery, the patient suffering from the effects of some of these sequelæ. In death within twenty-four hours of the appearance of the rash, with little sore throat, as if from the effects of a strong narcotic poison. In death on the first, second, or third day, with incessant vomiting, or diarrhœa, or with the two combined. In death, with strong febrile action on the fourth or fifth day, also with little affection of the throat. In death at more advanced periods of the disease from exhaustion, or from the effect of any of the several sequelæ.

POST-MORTEM APPEARANCES.—Traces of inflammation extending from the fauces through the œsophagus, and sometimes through the whole of the alimentary canal. Congestion or inflammation of the kidneys. Inflammation and swelling of the joints. Other post-mortem appearances are indicated under the head of Sequelæ and Terminations.

CAUSES.—*Predisposing.* Infancy and childhood; but no age is exempt.—*Exciting.* A specific contagion.

MORTALITY.—The deaths in London in a million persons living vary from 350 to 2,130, and average 900. The fluctuations from year to year are considerable, and *the rate of Mortality* in different epidemics has varied in the following proportions: 1, 2, 3, 6, 10, 16, and 25 per cent.

Laws of Infection.—The disease spreads from person to person, by fomites and through the air; its infecting distance is considerable; it lingers in the same place longer than other infectious diseases; it rarely attacks the same person more than once, but may occur a second and even a third time; it may be communicated by inoculation of the contents of the vesicles which are sometimes blended with the rash; it is thought to be communicable before the appearance of the rash, and for as much as three weeks after its disappearance. It is epidemic in certain seasons, as in 1840, 1844, 1848, 1852, and 1854.

Period of Incubation.—From a few hours, or two or three days, to ten days or a fortnight. It is sometimes stated at five days.

Diagnosis.—*From measles.* By the absence of cough, sneezing, and coryza; by the affection of the throat; by the peculiar appearance of the tongue; by the character of the eruption, its brighter hue, its greater extent, and less-defined form; by the occurrence of the rash in most cases on or before the second instead of on or about the fourth day; by the non-abatement of the fever on the subsidence of the rash. The great frequency of the pulse and the high temperature of the skin are also highly characteristic of scarlet fever, as are the secondary dropsy, affections of the joints, and mortifications. From the greater number of cutaneous disorders by the extent of the eruption, the sore throat, and the fever.

Prognosis.—The prognosis in scarlatina must always be regulated by experience of the existing epidemic, as well as by the form which the disease assumes. The danger is slight in scarlatina simplex, greater in scarlatina anginosa, greatest in scarlatina maligna. *Favourable symptoms.* The concomitant fever purely inflammatory, and slight affection of the throat; remission of the febrile symptoms, and of the affection of the throat, upon the appearance of the eruption; epistaxis, diarrhœa; or other critical discharge. [In one case, I have known all the threatening symptoms pass away, after a profuse discharge of mucus from the nostrils. (G.)] *Unfavourable symptoms.* The eruption being preceded by great anxiety, nausea, and vomiting; the fauces of a dark-red or purple colour, without swelling; ash-coloured or brown specks, soon becoming ulcerated, or terminating in gangrene (*cynanche maligna*); a brown tongue; great prostration of strength; early occurrence of delirium; coma; the fever running high after the period of desquamation; anxious difficulty of breathing, and stridulous voice, indicating the extension of the disease to the larynx and trachea; acute pain in the ear, with deafness and purulent discharge; the saliva tinged with dark blood; acrid discharge from the nose; the skin continuing obstinately dry; the desquamation followed by a fresh efflorescence and increase of fever; a sudden disappearance of the rash, or its assuming a livid hue; mortification; swelling of the joints; dropsical effusions; obstinate vomiting and diarrhœa; inflammation and suppuration of the parotid, submaxillary, salivary, and cervical glands; congestion or inflammation of the brain or lungs. The pregnant, and especially the puerperal, state, and teething.

A favourable convalescence may be expected when the pulse falls much below its natural frequency in health; and a marked improvement is generally indicated by a fall of the pulse at night as compared with its frequency in the morning. A frequent pulse continuing when the urgent symptoms have subsided, would lead us to anticipate a lingering convalescence or the occurrence of secondary symptoms. (G.)

Treatment of Scarlatina.

Scarlatina Simplex.

The treatment of scarlatina simplex will consist in keeping the patient in a moderate and equable temperature, about 60° Fahr.; in clean and spacious apartments; enforcing a light diet without animal food; directing cooling acidulated liquors for common drink, and the saline draught as medicine, and keeping the bowels regular by gentle aperients, more particularly towards the decline of the eruption. The treatment may be advantageously commenced with an emetic (Ipecacuanha, ℈i; Antim. pot. tart. gr. i. for the adult), followed by a saline aperient, or by a full dose of castor-oil.

Scarlet fever without eruption may be treated in the same manner.

Scarlatina Anginosa.

Indications.—I. To lower febrile action. II. To reduce the inflammation of the throat without exhausting the strength.

I. The first indication is best fulfilled by tartar emetic, in doses of an eighth, a sixth, or a quarter of a grain, according to the degree of the febrile action. When the heat of the body is much, and steadily, above the natural degree, and the skin dry, the *cold affusion* may be employed, or (and this is to be preferred) the body may be frequently sponged with cold or with warm water, being carefully dried as soon as the heat is reduced, or the slightest chill experienced.

II. When severe inflammation of the throat is present, with much external tenderness, and great difficulty in swallowing, from six to twelve leeches may be applied to the angle of the jaw, followed by a large warm bread-and-water poultice, and repeated if necessary. Ice swallowed freely, and cold lotions or ice-water applied externally to the throat, are the chief remedies, when the heat of the skin is considerable; but care must be taken that the heat of the body is not too much reduced. Where ice cannot be procured, cold liquids must be substituted. When the heat of the surface is not so great, warm fomentations may be substituted for cold applications. Blisters and stimulating external applications, and scarification of the tonsils, are of doubtful efficacy. Acidulated gargles (such as the compound infusion of roses with an excess of acid) may be used to clear the throat; but if ice can be procured, these are unnecessary. A strong solution of lunar caustic applied to the fauces with a camel's-hair brush often gives great relief.

At the decline of the eruption, tonics are required, especially

quinine, cinchona, or cascarilla; and a nutritious diet with wine, in moderate quantities.

Scarlatina Maligna.

Scarlatina which assumes the typhoid character, at whatever period of its course, is a highly-dangerous disease, and requires the employment of cordial tonics, acids, and wine, in large and repeated doses, as recommended for the cure of the typhoid form of continued fever. When the throat is covered with sloughs, stimulating and astringent gargles must be used very often. Of these, the Cayenne-pepper gargle is the most efficacious. Gargles containing chlorine are also to be strongly recommended. Or a strong solution of nitrate of silver (℈i. or more to the ounce) may be applied to the throat with a camel's-hair brush.

In children, the gargle may be injected into the nostrils, or the nitrate of silver solution may be applied with a brush.

Chlorate of potash (a drachm to a pint of water) has been strongly recommended as a drink in cases of severe scarlet fever. A pint to a pint and a half to be taken in the course of the day.

When abscesses in the neck, purulent discharge from the ears, ophthalmia, pneumonia, cerebral affections, or other diseases, succeed scarlatina, they are to be treated on ordinary principles, according to the severity of the inflammation and the existing state of system. Swelling of the joints is best treated by warm fomentations. (For the treatment of dropsy following scarlatina, see Anasarca.)

Proper aperients, tonics, nutritious diet, warm clothing, and cautious avoidance of exposure to cold or damp, must be employed and observed after recovery from this disease.

REMEDIES.—Bleeding; Emetics; Purgatives; Bark; Wine and stimulants; Cold affusion. These, considered as remedies for all cases of scarlatina indiscriminately, are now disused and condemned. Though, for obvious reasons, not conclusive, the following figures afford some evidence of the relative value of three modes of treatment. *Bleeding.* Cases 181, deaths 29: proportion 1 in 6. *Purgatives and Emetics.* Cases 255, deaths 20: proportion 1 in 12¾. *Mineral Acids and Wine.* Cases 300, deaths 5: proportion 1 in 60. (Altered from a table by Dr. Robert Williams, Elements of Medicine, vol. i. p. 152.)

PROPHYLAXIS.—As the disease is highly contagious, the same precautions are required to prevent it from spreading as are recommended under the head of continued fever (see p. 319). Free ventilation of the sick chamber, the prompt removal of excreta, the placing of all linen removed from the person in cold water, and strict separation, are the principal means to be adopted during the progress of the disease; the thorough cleansing of the apartment, of the bedding and of its furniture, after the recovery of the patient.

Belladonna has been recommended by Hahnemann, in the dose of one-eightieth of a grain twice a-day as a prophylactic, on the strength of the property, imagined or pretended to belong to it, of producing

symptoms analogous to those of scarlet fever, and in accordance with the homœopathic hypothesis. Very small doses of calomel and of the sulphuret of antimony in combination have also been recommended; and Dr. Sims regarded a few grains of rhubarb given every morning as a preventive. These alleged prophylactics are of about equal value. Of belladonna, Dr. Robert Williams says: "There is no evidence to show that belladonna possesses the property attributed to it, or the power of producing scarlet fever, while the cases of exemption after this practice are most questionable." And the folly and fallacy of the suggestion have been proved by comparative experiments, well devised and carefully carried out by Dr. Balfour, at the Royal Military Asylum at Chelsea.

PESTIS—PLAGUE.

DEFINITION.—A contagious fever, generally of the continued type, accompanied by an eruption of buboes, carbuncles, and petechiæ.

SYMPTOMS.—The patient is attacked suddenly,—or after slight premonitory symptoms, consisting of rigors, lassitude, depression of spirits, pain and weight of head, and giddiness,—with an indescribable feeling of anxiety, and extreme restlessness and severe pain referred to the region of the heart. The countenance is expressive of exhaustion and anxiety, the eye is dull and sleepy, the eyelids closed, the mouth half open. The gait is staggering and uncertain, like that of a drunken man; the debility extreme; the head falls upon the breast; the eyes are dull and sunken, the complexion dingy; there is nausea, or bilious vomiting, often accompanied by diarrhœa; the urine is scanty, high-coloured, and sometimes bloody; the tongue is swollen, furred, and glistening, but moist and clean towards the tip and edges; pulse from 115 to 130, and very feeble; respiration hurried; speech indistinct and faltering. This first stage, which commonly lasts twelve hours, is followed by reaction, with increased restlessness, disturbed sleep, and confusion of thought alternating with coma. The countenance retains its former expression, but the eye assumes a peculiar brightness, and the pupil is dilated. The pulse is hard and full, or very frequent; or weak, fluttering, and intermittent; the tongue is dry, parched, of a yellowish colour, red in the centre and at the edges; then brown, cleft, and horny; the lips, teeth, and nostrils coated with dry sordes: there is intense thirst, and constant nausea, with occasional vomiting of a blackish fluid; the evacuations from the bowels dark and offensive, and occasionally mixed with grumous blood; and hæmorrhage sometimes takes place from the nose. On the second or third day, but sometimes much later, and sometimes as early as the first day, the characteristic external marks of the disease begin to show themselves. Darting pains in the axillæ, groins, or neck, indicate the commencement of the characteristic glandular swellings and carbuncles.

In favourable cases, these swellings are bright-red: in the more dangerous, livid or purple.

In favourable cases, the crisis is by profuse perspiration and suppuration of the tumours, the patient beginning to amend from the sixth or eighth to the fourteenth or twentieth day. In unfavourable cases, the skin remains harsh and dry; the pulse is small and fluttering; low muttering delirium and laborious breathing set in; the eye is sunk, the countenance wears a ghastly expression; the skin becomes covered with petechiæ and vibices; the buboes remain stationary; the powers of life give way, the patient becomes comatose, and death takes place, commonly on the fourth or fifth day, without a struggle.

In the most favourable cases, the patient is able to go about his usual avocations, though suffering from the swelling of the glands. In the worst cases, the patient never recovers from the first shock to the nervous system, but sinks within twenty-four hours, or as late as the second or third day, before the buboes have made their appearance.

The plague may be said to assume four degrees of severity: 1. Slight fever, without delirium, or buboes; 2. Fever, delirium, and buboes; 3. Fever, delirium or coma, buboes, carbuncles, and petechiæ; 4. Congestive fever, fatal on the first, second, or third day, before the appearance of buboes. The fever, though usually continued, may assume the intermittent or remittent type.

CAUSES.—*Predisposing.*—Poverty, filth, overcrowding, debility, disease, intemperance, adult age, female sex.

Exciting.—A specific contagion. This is doubted by some authorities, but probably with as much reason as the contagiousness of typhus fever is called in question by others.

LAWS OF INFECTION.—Communicated by contact with the patient, with fomites, or with the dead body. Second attacks rare. Affects the fœtus in utero. Period of incubation, from a few hours to about twenty days. The disease is endemic in Egypt, often spreads to surrounding countries, and formerly prevailed in almost every part of Europe. An analogous disease is believed to exist in some parts of India. In common with other epidemics, plague attacks few persons at first, gradually attains its maximum intensity, and subsides as gradually. The rate of mortality is also greatest at the commencement of the epidemic, and at its first outbreak in any particular district.

MORTALITY.—At the first outbreak, nine-tenths of the cases, or more; in the decline, a small proportion only of the cases. Throughout an epidemic from one-third to two-thirds, or even four-fifths, of the persons attacked. A third, or nearly one-half of the population of cities attacked by the plague is believed to have perished. In Smyrna, during five months of 1834, out of 5,727 persons attacked, 4,831 died, and 907 recovered: 1 in 23 of the whole population suffered, and

about 1 in 27 died; the deaths constituting 84 per cent. of the cases. (See Lib. and Cyclop. Pract. Med., Art. Plague.)

PROGNOSIS.—Highly unfavourable, especially at the outbreak of the disease when the majority of cases end fatally: guarded even in mild cases.—*Favourable symptoms.* The early formation of firm and moveable buboes passing rapidly into suppuration; profuse perspiration; an absence of severe fever; the survival of the patient beyond eight days.—*Unfavourable symptoms.* Subsidence of the buboes; suppression of urine; hæmaturia; cyanosis; petechiæ; obstinate vomiting; and all the symptoms which would be deemed unfavourable in an attack of continued fever. The puerperal state.

TREATMENT.—That of typhus fever, with appropriate local applications to the buboes and carbuncles, namely, warm poultices to promote suppuration, followed by prompt incisions. Salivation by mercury has been recommended, and, where it has taken place, seems to have been beneficial. The disease appears, however, to be almost equally fatal under all modes of treatment.

PROPHYLAXIS.—Strict separation from patients suffering under the disease, and avoidance of contact with clothing or furniture used by them; and during the prevalence of the malady a strict observance of all the laws of health. In the case of ships from infected places, a quarantine of twenty-one days; and if having cases of plague on board, twenty-one days from the recovery of the last case.

CHAPTER V.

FEBRIS HECTICA	Hectic Fever.
FEBRIS INFANTUM REMITTENS	Infantile Remittent Fever.
FEBRES PUERPERALES . . .	Puerperal Fevers.
CELLULITIS VENENATA . .	Dissection-wounds.
FARCINOMA	Glanders.

FEBRIS HECTICA—HECTIC FEVER.

DEFINITION.—A remittent fever, arising from local irritation in a weakened constitution.

SYMPTOMS.—Chills, succeeded by flushes, terminating in a hot skin and frequent pulse, and these by perspiration, constitute the paroxysm of hectic fever. There are commonly two such paroxysms or exacerbations in the twenty-four hours. The first generally occurs about noon, and lasts for four or five hours. After a short interval of freedom, a more violent exacerbation follows, which increases in violence till about two o'clock in the morning, when a perspiration, at first partial and then universal, breaks out and resolves the paroxysm.

The pulse during the paroxysms is generally quick and frequent, ranging from 96 to 130, or even more; the urine is high-coloured, and deposits a pink sediment; the cheeks have a florid circumscribed redness; there is burning heat in the palms of the hands and soles of the feet. During the remission, the pulse is reduced in frequency, but seldom falls so low as in health. The appetite is not much impaired; and the tongue is clean, moist, and red. The patient rapidly loses flesh.

At length the paroxysms become more violent and the remissions shorter; the appetite fails; colliquative sweats alternate with diarrhœa; and under an increased severity of these symptoms, and of the disease which causes the hectic fever, the patient sinks.

DIAGNOSIS.—From idiopathic remittent fever by the pre-existence of local disease.

PROGNOSIS.—Favourable or unfavourable according to the nature of the local disease, of which the fever is the effect and symptom.

CAUSES.—This fever generally arises from the formation of matter, or its absorption from large surfaces, as in suppuration of the lungs, liver, hip-joint, &c. But it may arise from any local irritation in weakened constitutions, even when no suppuration exists. The infan-

tile fever which arises from irritation of the alimentary canal is but one form of hectic; and the disease is often present in the early stage of phthisis pulmonalis, before there is any reason to believe that suppuration has taken place. It is in advanced stages of consumption that hectic fever is developed in its most characteristic form.

TREATMENT.—This must depend on the disease of which the hectic fever is symptomatic. If there is no apparent disease to produce the hectic symptoms, the treatment must be that of debility, and the sulphate of quina will be the appropriate remedy. A course of sarsaparilla, with a milk or vegetable diet, now and then removes a hectic fever, the cause of which is not apparent.

FEBRIS INFANTUM REMITTENS—INFANTILE REMITTENT FEVER.

SYNONYMS.—Infantile gastric remittent—infantile hectic—worm fever—mesenteric fever—stomach fever—low fever of children—marasmus.

DEFINITION.—A hectic fever due to local irritation, of which the bowels are the usual seat, and constipation the most common cause.

SYMPTOMS.—Pallor, languor, drowsiness, and chilliness in the morning; flushed cheek, hot skin, restlessness, and feverishness towards evening; followed at night by profuse sweating, and towards morning by a distinct remission. Skin dry; tongue moist, but coated; pulse frequent; appetite variable and capricious, or altogether wanting urine scanty and high-coloured, and depositing a whitish sediment; bowels costive or relaxed, or both alternately; the evacuations slimy and sour-smelling, or highly offensive, dark, green, pitchy, or clay-coloured, or with an abundant secretion of bile; the abdomen tumid and often hot to the touch; the breath offensive; the skin extremely irritable, so that the child is constantly picking the nose, lips, corners of the eyes, fingers, and anus.

In less severe cases, the remittent character of the fever is less strongly marked; the chilliness and languor of the morning, and the febrile exacerbation of the evening being very indistinct, and the child merely looking pale and listless, and losing its appetite. Sometimes the disease becomes chronic, and is marked by paroxysms less intense but of longer duration; the abdomen becomes larger and harder, the tongue more loaded, the constipation generally present in the acute form is changed for a constant and distressing diarrhœa, the patient wastes rapidly, until the plump and rosy features of the child are changed to the meagre aspect of shrivelled old age. The more the child wastes away, the more restless and irritable does it become, till the last stage of debility arrives, when it dies from exhaustion, in a state of total unconsciousness, or with the mental faculties unimpaired.

to the very last. The disease may occur at any age, from one or two years up to puberty.

COMPLICATIONS AND TERMINATIONS.—A dry cough, and, if tubercles exist in the lungs, phthisis; enlargement of the cervical glands; torticollis; skin disease (strophulus); irritation of the brain, and sometimes hydrocephalus; tabes mesenterica.

MORBID APPEARANCES.—Inflammation, or ulceration of portions of the alimentary canal, especially of the small intestines. Enlargement, induration, or suppuration of the mesenteric glands. Traces of inflammation and its consequences in the brain or lungs.

DIAGNOSIS.—From hydrocephalus, by the absence of coma, strabismus, and convulsions; by the want of distension in the veins of the scalp, and the want (in infants) of prominence in the fontanelles; by the absence of extreme heat of the head, and by the greater frequency of the respiration. In hydrocephalus, too, the bowels are more obstinately confined, and the urine more apt to be suppressed.

PROGNOSIS.—Generally favourable. In the ascertained absence of hydrocephalus, and of extensive disease of the mesenteric glands, the practitioner may safely hold out a prospect of recovery.—*Unfavourable.* When the mesenteric glands are diseased, and when, in spite of appropriate remedies, large quantities of sour, highly-offensive liquid fæces continue to be discharged day by day.

CAUSES.—*Predisposing.* All causes of debility, such as bad air, want of exercise, confinement within doors, and improper or deficient food.—*Exciting.* Irritation of the mucous membrane of the intestinal canal by constipation or improper diet; worms (the symptoms in this case are generally less strongly marked); diarrhœa; teething.

TREATMENT.—*Indications.* I. To remove all causes of irritation from the stomach and bowels.

II. To suppott the patient's strength.

III. To subdue local inflammation and remove local irritation.

I. The first indication is answered by—(a) strict regulation of the diet; (b) the continued use of purgative medicines.

(a) *Diet.*—As long as vomiting or diarrhœa is present, a strict farinaceous diet should be prescribed, or farinaceous food made with milk; as milk-gruel, arrowroot, or sago. In the absence of diarrhœa, rice-milk or bread-pudding; and, in cases of extreme debility, light animal broths or jellies may be prescribed. In young children no animal food should be allowed. In infants a still stricter diet is often necessary, and the quantity as well as the quality of the food must be carefully regulated. At this early age the stomach is often very irritable, and rejects even the simplest farinaceous food. In such cases a table-spoonful of new milk from the cow should be given every half-hour or hour. This treatment is often very effectual. The stomach wants rest, and the patient wastes because it is not allowed to rest: it

rejects food in ordinary quantity, and will bear none in any quantity but that which is natural to it at that early age.

(b) *Purgatives.*—When the bowels are costive, purgatives must be administered day after day, till the patient recovers. As the evacuations improve in character, the symptoms also improve, and when the bowels are restored to their natural state the patient is well; so entirely does the disease depend upon the state of the first passages. Equal quantities of the pulvis rhei and hydr. cum cretâ (five grains of each for a child ten years of age), may be given every night, or every other night, followed the next morning by a full dose of castor-oil. This treatment may be continued for weeks without bad effects, and, in by far the majority of cases, with no fear of salivation. It is not necessary to produce violent action of the bowels; one or two motions a-day will be enough, and hypercatharsis must be carefully avoided. In obstinate constipation calomel may be substituted for the hydr. c. cretâ, and pulvis jalapæ for pulvis rhei. If diarrhœa exists at the outset, it may generally be removed in one or two days by the diet prescribed; but if not, a single grain of hydrargyrum c. cretâ, with three or four grains of the pulvis cretæ comp. c. opio, given three times a-day, will soon succeed in removing it. When the diarrhœa has ceased, but not before, purgatives may be resorted to, and continued every night, or every alternate night, followed by the castor-oil in the morning, until the patient is restored to health.

II. The patient's strength rarely requires support; pure air, proper exercise, and a vegetable and milk diet, are the best restoratives. The proper ventilation of the bed-room or nursery is of the first importance. Should *tonics* appear necessary, the steel wine, in doses of a tea or dessert spoonful three times a-day, according to the age, or quinine in doses of from one to two grains, or the tonic infusions, may be given. But aperients are, in this disease, the best of tonics. The direct treatment of the existing debility by nourishing diet and stimulants, to the neglect of aperients, is a vulgar and often fatal error.

III. Depletion is rarely required in infantile fever. If, however, the brain is much affected, the head hot, and the patient very restless, one or two leeches or more, according to the age, may be applied to the temples. But cold lotions to the head will generally suffice to subdue any inflammation that may be present. If the child is teething, the gum-lancet should be freely used; if there are worms, they will be removed by the common purgatives already recommended; if there should be any irritation in the lungs, accompanied by mucus in the bronchial tubes, tartar-emetic in doses of one-tenth to one-sixth of a grain may be given according to the age, in combination with one or two grains of hydr. c. cretâ, three or four times a-day: if the disease is complicated with dysentery, clysters of gruel may be frequently used; if the belly is hard and tumid, with enlargement of the mesenteric glands, much good may be derived from repeated friction with the hand or with a flannel moistened with olive-oil; if the cervical glands are enlarged, they may be covered with the emplastrum hydrargyri c. ammoniaco, or painted with iodine.

Tabes mesenterica requires the same treatment as the infantile fever, of which it is a frequent consequence. A strict diet, purgatives, if there is no diarrhœa, emollient clysters, frequent frictions to the abdomen, and tonics—when they do not displace these more important remedies—constitute the treatment.

FEBRES PUERPERALES—PUERPERAL FEVERS.

Under this designation authors have described several forms of disease, differing in many of their characters, but agreeing in the general feature of combining a well-marked febrile affection with a local disease varying in seat, character, and intensity. The following distinct forms are recognised by authors:—

1. Acute puerperal peritonitis.
2. Adynamic, or Malignant puerperal fever.
3. Puerperal intestinal irritation.
4. False puerperal peritonitis.
5. Milk fever.

ACUTE PUERPERAL PERITONITIS.

Symptoms.—Severe rigor, commencing on the second, third, or fourth day after delivery, and in some cases much later; followed by acute pain in the abdomen, and generally in the hypogastric region. The pain is constant, augmented at intervals, increased by pressure, and by motion, and accompanied by fulness and tension of the abdomen. The secretions, especially the milk and lochia, are checked; the skin is hot; the pulse sometimes frequent, small, and wiry, at others full and bounding; the tongue furred. There is headache, restlessness, and sleeplessness, with anxious and suffused countenance, occasional vomiting, and hurried respiration. In unfavourable cases, the pain and tension of the abdomen increase, and it feels hard and tympanitic; the pulse becomes more and more rapid, the skin cold and clammy, the head first feels confused, and then muttering delirium follows; the tongue becomes dry and brown, the teeth covered with sordes; distressing eructation and vomiting, hiccough, subsultus tendinum, facies hippocratica, and cold extremities usher in the fatal result.

Morbid Appearances.—Redness of the peritoneum, especially of that covering the uterus and its appendages, or lymph effused into its cavity. The uterus, ovaries, and Fallopian tubes covered with a creamy matter. Purulent deposits sometimes found in the muscular structure of the uterus; ovaries often disorganized.

Causes.—Contagion. The common causes of inflammation. It is often epidemic, and coexists with or precedes the malignant variety.

PROGNOSIS.—*Favourable*, but guarded, if the treatment is commenced early, and if the reigning epidemic is of a mild character.

TREATMENT.—*Indications.* I. To reduce inflammatory action; II. To remove local irritation.

I. Prompt treatment is required.—Bleeding in the erect or semi-erect posture, to the approach of syncope, or leeches in large numbers to the abdomen, according to the severity of the symptoms and the strength of the patient; and to be repeated if necessary; hot fomentations to the abdomen; calomel in doses of five grains, in combination with half a grain of opium, or with five grains of Dover's powder, every two, three, or four hours, continued till salivation takes place. Cooling drinks and cool air. When there is much debility, nourishing food and stimulants, as wine, brandy, and ammonia, or turpentine, taken by the mouth, and in the form of injection.

II. A purgative of castor-oil, or salts and senna, to be administered at the outset, and to be followed up at short intervals, so as to keep the bowels open. Warm-water injections thrown up into the rectum and vagina.

If swelling, tension, and tenderness of the abdomen continue after the antiphlogistic remedies have been carried to their full extent, a blister may be applied to the abdomen, and dressed with mercurial ointment, or the abdomen may be fomented with hot turpentine.

ADYNAMIC, OR MALIGNANT PUERPERAL FEVER.

SYMPTOMS.—More obscure than the foregoing: the rigor less strongly marked, the pain in the abdomen less severe, little increased by pressure, deep-seated, more circumscribed, and often limited to the hypogastric or iliac regions. The pulse, from the first, extremely small, rapid, and weak, ranging from 130 to 160; countenance anxious and sunk, skin of a livid yellow tinge; extreme restlessness; intellect, though sometimes clear to the last, generally wandering; low, muttering delirium; tongue at first white, then dirty yellow, then dry and brown; if blood is taken, its colour is dark, and the coagulum very loose; eructation, vomiting, hiccough, diarrhœa; the evacuations highly offensive; lochial discharges fetid and often suppressed; breasts flaccid; abdomen tumid and tympanitic. Death after the usual typhoid symptoms, or slow recovery.

MORBID APPEARANCES.—Peritoneum of a dusky colour, the effused fluid dirty brown, often bloody and very glutinous, and mixed with shreds of lymph. Fetid gas in the intestines. Uterus disorganised, softened, or gangrenous; ovaries broken down and reduced to a pulp. Pus in the veins of the uterus, and in the joints; inflammation, and abscess of the cellular membrane of the leg, &c. In a few cases a remarkable destruction of the eye.

CAUSE.—Contagion.

PROGNOSIS. — *Unfavourable* in all cases; chances of recovery slight.

TREATMENT.—*Indications.* I. To reduce local inflammation at the least sacrifice of strength. II. To remove local irritation. III. To support the patient's strength.

I. Blood-letting, if employed at all, must be used with great caution. The hand must be kept on the pulse, and the effect carefully noted. If the pulse increases in fulness and force after the abstraction of a small quantity of blood, it may be allowed to flow more freely. Calomel, in doses of from three to five grains, every two or three hours, with half a grain or a grain of opium; or calomel in combination with three or four grains of ipecacuanha, or equivalent doses of James's powder or tartarized antimony. Hot fomentations, hot turpentine, or blisters to the abdomen.

II. The bowels to be kept open by occasional doses of castor-oil, and warm water to be injected, from time to time, into the rectum and uterus.

III. Nourishing diet, ammonia, spirituous stimulants, oil of turpentine, &c.; and the treatment proper to the typhoid form of fever.

PUERPERAL INTESTINAL IRRITATION.

SYMPTOMS.—General uneasiness, coming on at any period after delivery, if the bowels have been neglected; loss of appetite; tongue furred; chills alternating with flushes; headache; frequent pulse; abdomen large and rather tense; slight, deep-seated pain, relieved by steady pressure; nausea and vomiting of a dark and offensive fluid; diarrhœa; evacuations dark, fetid, watery, or slimy; flatulence; fetor of breath. In unfavourable cases, the exacerbations of fever become more severe and of longer duration, and are attended with extreme debility and despondency; there is the red tongue of acute gastric irritation; the mucous membrane of the tongue and mouth is often covered with aphthæ. The diarrhœa continuing and the strength diminishing, the febrile symptoms become more constant and severe, and the disease gradually assumes the shape of the malignant puerperal fever.

MORBID APPEARANCES.—Generally none. Sometimes inflammation, with or without ulceration, of the mucous membrane of the intestines.

PROGNOSIS.—Generally favourable, if promptly treated; unfavourable if neglected.

TREATMENT.—*Indications.* I. To remove the offending matter from the bowels. II. To support the strength.

I. The first indication is met by a full dose of calomel and opium, followed, after two or three hours, by castor-oil or the senna draught. The effect on the bowels may be kept up by calomel in doses of from

three to five grains every three or four hours, and enemata of warm water may be administered from time to time.

II. The second indication is fulfilled by the usual tonic or stimulating remedies, and nourishing diet.

If the disease runs into either of the foregoing, the remedies appropriate to that form of the disease must be employed.

FALSE PUERPERAL PERITONITIS.

SYMPTOMS.—After a slight rigor, pain and tenderness of the abdomen, a slightly-coated tongue, a rapid and very compressible pulse; temperature of the skin little increased; expression of the countenance free from anxiety; strength not much impaired. It is most apt to occur in delicate and nervous females, after unusually severe after-pains, or from the violent operation of a purgative.

PROGNOSIS.—Favourable.

DIAGNOSIS.—From true puerperal peritonitis by the milder character of the symptoms.

TREATMENT.—Fomentations, poultices, diaphoretics, and opiates, with an occasional mild laxative. Ten grains of Dover's powder, or from 20 to 30 drops of laudanum, may be given at once, and repeated at suitable intervals if attended with benefit.

There is a form of puerperal fever of occasional occurrence, and characterised by symptoms similar to those of false peritonitis, but with the addition of profuse perspiration, and frequently of diarrhœa, with nervous excitement and violent palpitations of the heart. This is called Hidrosis or Hidrotic fever. The therapeutic indications are —I. To remove local irritation; and II. To support the strength. For this latter purpose, quinine, or stimulants in combination with opium, may be employed.

MILK FEVER.

SYMPTOMS.—After well-marked rigor, occurring about the third day after delivery, great pain and throbbing in the head; intolerance of light and sound; flushed countenance; contracted pupils; conjunctiva injected; pulse frequent, full, and hard; skin hot and dry; thirst excessive; tongue dry and coated. If the symptoms are not speedily relieved, the secretion of milk is suppressed; the breasts become flaccid; the head symptoms more severe; and delirium sets in.

CAUSES.—Heated atmosphere, undue exertion, mental agitation.

DIAGNOSIS.—From other fevers occurring in puerperal women by the great disturbance of the circulation, with the strong determination to the head.

Indications.—I. To reduce arterial action. II. To promote the secretion of the milk.

I. Arterial action may be subdued, in slight cases, by saline aperients and tartar emetic in small doses; by low diet; rest of mind and body; cool air; and warm diluent drinks. In more severe cases, bloodletting in a full stream, and repeated if necessary, followed by tartar emetic in full doses, and brisk mercurial purgatives. Cupping, or leeches to the temples, and cold lotions or ice to the head, according to the severity of the head symptoms. Hot water to the feet, and, in severe cases, mustard poultices to the legs.

II. To fulfil the second indication, the milk should be gently drawn off, and the breast be fomented or poulticed. The child should also be occasionally applied to the breast.

GENERAL OBSERVATIONS ON PUERPERAL FEVER.

The diseases which are usually characterised by the term Puerperal Fever, are the first two of the present group—acute puerperal peritonitis, and adynamic or malignant puerperal fever. Both these diseases have been observed in different epidemics; and cases of both forms occur in the same epidemic; just as continued fever, in one year takes the shape of synocha, in another of typhus, whilst in a third, cases of both are observed to occur at the same time. In the mode of commencement, too, there is an analogy between puerperal fever and common continued fever. The first stage of congestion sometimes assumes so marked a character in both as to give the disease the name of *congestive;* in like manner the stage of reaction may be so strongly marked, as to gain for the fever the name of *inflammatory;* or the symptoms, from the first, may be accompanied by that extreme debility and nervous depression which are characteristic of the *typhoid* state. These strong analogies, added to the acknowledged contagious character of both diseases, lead to certain general views which have an important bearing on the treatment. It is only by recognising in these different forms the same essential disease, varying with the season, and "epidemic constitution," on the one hand, and with individual peculiarities on the other, that the treatment of the disease can be conducted on rational and safe principles. In this disease more than in most others, it will not do to treat a name, to place reliance upon any approved prescriptions, or to follow implicitly the experience of any single epidemic. Puerperal fever, like continued fever, must be treated on general principles; reaction must be brought about by prompt measures when congestion exists; inflammation must be subdued by depressing remedies, when the disease takes on the inflammatory character; severe nervous symptoms and acute neuralgic and muscular pains must be met by full doses of opium; local complications must be treated with as little expense of blood and strength as possible; and the strength must be carefully supported by nourishing food, and the liberal use of alcoholic stimulants, when the typhoid character prevails from the first, or supervenes in the course of the disease.

CELLULITIS VENENATA—DISSECTION WOUNDS.

DEFINITION.—Inflammation of the cellular tissue, often accompanied by severe febrile symptoms, produced by a peculiar poison generated by the dead body, and absorbed from wounds.

The wound may be received in the act of dissecting, or it may exist previously; but in some cases no wound or injury of any kind has been discovered.

SYMPTOMS.—In the greater number of cases the disease sets in, within a few hours of the receipt of the injury, with inflammation at the seat of the puncture; but in rare instances the local affection is preceded by febrile symptoms, ushered in by severe rigors. The inflammation commencing in the puncture first affects the hand, then gradually extends up the arm till it reaches the axilla, whence it sometimes extends to the trunk, and even to the lower extremity. It is accompanied by swelling, tension, and throbbing pain in the parts affected; the course of the absorbent vessels is often indicated by dusky red lines, or by an erythematous blush, with irregular defined outline, and the absorbent glands above the elbow and in the axilla are swelled and painful. The inflamed parts are at first exquisitely painful, but become less sensitive as the disease advances. In favourable cases the inflammation terminates in serous effusion, which is gradually absorbed. In more severe cases suppuration of the cellular tissue, both superficial and deep seated, occurs, and abscesses form under the theca of the punctured finger, or diffused abscess attacks the cellular membrane on the hand and arm, or even on the trunk of the body. When the inflammation runs very high, it sometimes terminates in extensive sloughs. In some of the least favourable cases the local affection is very slight. The punctured part becomes the seat of a small vesicle or pustule, and the inflammation at once attacks the axillary glands; the neck and upper part of the chest are swollen, stiff, and painful; and the inflammation sometimes extends itself over the trunk till it even reaches the lower extremities. Occasionally deep-seated diffused abscesses form without any superficial inflammation. The local affections are accompanied by febrile symptoms, generally of the typhoid type, with profuse fœtid sweats, great debility, extreme depression of spirits, and high nervous excitement. The mind is generally unaffected; but the patient sleeps little, and is sometimes delirious at night. Recovery is often slow and imperfect, the hand remaining stiff in consequence of the slow absorption of effused fluids, the thickening of the textures, or the injury attending on suppuration or gangrene of the parts. The general health is also regained slowly.

CAUSES.—*Predisposing.*—Debility, from whatever cause; cachexia. *Exciting.*—A contagious matter absorbed, in most instances, from a sore or wound on the hand, in persons handling dead animal matter.

LAWS OF INFECTION.—The contagious matter seems to be most active in bodies recently dead, especially if the death has been caused

by puerperal peritonitis. The period of incubation is very short—from a few hours to a few days.

DIAGNOSIS.—The diagnosis is difficult in those rare cases in which no punctured wound or other injury can be discovered. The acute sensibility of the inflamed parts is very characteristic.

PROGNOSIS.—The mortality in the more severe class of cases is about 50 per cent. *Favourable symptoms.*—The inflammation limited to the fore-arm; well-marked phlegmonous inflammation; acute abscess; early suppuration of the glands of the axilla. *Unfavourable symptoms.*—Indolent inflammation; diffused chronic abscess; gangrene; extension of the inflammation beyond the axilla; the axilla attacked without intervening inflammation of the fore-arm and arm; acute pain, and great nervous excitement.

TREATMENT.—*Indications.*—1. To subdue inflammation, or promote healthy suppuration in the inflamed parts, and the free discharge of matter when formed. 2. To support the patient's strength. 3. To soothe pain and allay nervous excitement.

1. When local inflammation runs high, leeches may be applied to the inflamed part, followed by warm fomentations, unless cold applications should prove more grateful to the patient. When suppuration is taking place, warm poultices, or rags dipped in warm water and covered with oil-cloth, should be kept constantly applied. When matter has formed, it should be discharged by free and deep incisions.

2. The patient's strength will generally require to be supported by stimulants, such as ammonia and ether, with a liberal supply of wine and a nourishing diet; but in the beginning of the illness it may be necessary to adopt an opposite mode of treatment; and in plethoric subjects, or where the fever is of the inflammatory type, and runs high, it may even be expedient to take blood freely from the arm.

3. The third indication is fulfilled by keeping the patient under the influence of opium. When the patient suffers from acute pain and great excitement, full doses of opium or of its preparations should be given; such as half a drachm of tincture of opium, or half a grain of muriate of morphia. The effect of the opiate should be watched, and, if favourable, the dose should be repeated every two, three, or four hours. The opiate may be combined with ammonia or ether when great debility is present, or symptoms allied to typhus.

The rest of the treatment will consist in the occasional administration of aperient medicines, to keep up a free action of the bowels.

PROPHYLAXIS.—Wounds received in dissection, especially of bodies recently dead, should be immediately attended to, especially if the operator is not in good health. The hand should be washed, and the wounded finger or part be kept in the mouth, moistened by saliva, and submitted to suction. On the appearance of the least inflammation a poultice should be resorted to. The application of caustic to the wound is a doubtful policy.

FARCINOMA—GLANDERS—FARCY.

SYNONYM.—Equinia.

DEFINITION.—A contagious malady, characterised by inflammatory tumours in different parts of the body, and caused by contact with the horse or other quadruped affected by glanders, or with persons suffering from the same disease.

VARIETIES.—1. Acute glanders. 2. Chronic glanders.

1. *Acute Glanders.*

SYMPTOMS.—The disease generally sets in with pain in the head, back, and limbs, rigors, nausea, thirst, great prostration of strength, and stiffness and pain in the joints, increased by motion. These symptoms are followed, after a short but variable interval, by tumours, red, painful, and tender, in different parts of the body, terminating in abscesses discharging a fœtid sanies, and passing quickly into a state of gangrene. From the fourth to the sixteenth day, in the greater number of cases, a profuse discharge of a yellow or sanious fluid from the nostrils sets in, accompanied by redness, heat, swelling, and excoriation of the nose, lips, and cheeks; the eyes are inflamed, and the eyelids swollen. Pustules and black bullæ appear on the face, trunk, limbs, and parts of generation. These local symptoms are accompanied by a hot skin, urgent thirst, frequent, weak, and irregular pulse, and feeble respiration. The tongue is covered with a dark fur; the skin is bathed in a profuse and offensive perspiration; the evacuations are slimy and fœtid. These symptoms increase in severity, and are followed, after a few days, by diffused abscesses in different parts of the body, especially about the joints; typhoid symptoms rapidly supervene; the nose and lips become gangrenous; the discharges extremely offensive; low muttering delirium sets in, and death takes place by collapse. The greater number of patients die within a fortnight, but a few cases survive till the third or fourth week, and one death is reported at the end of more than two months.

ANATOMICAL CHARACTERS.—Besides the pustules and tumours on the surface, congestion of the mucous membrane of the nose, fauces, air-passages, and alimentary canal; congestion of the lungs; phlebitis; purulent deposits in the lungs and joints; diffused abscess in the cellular membrane; and sero-sanguinolent fluids in the serous cavities.

CAUSES.—Contagion and infection. The disease originates in quadrupeds, and is most commonly communicated from the horse to the human subject.

DIAGNOSIS.—This presents no difficulty. The peculiar discharge from the nostrils, the seat and character of the pustules, the history of the case, and the occupation of the patient, prevent it from being confounded with any other disease. Farcy is distinguished from glanders

by the absence of the peculiar discharge from the nostrils. But the two terms, Glanders and Farcy, are not used with much discrimination, at least in the human subject. Farcy, as it occurs in the horse, is distinguished as *button-farcy* and *bud-farcy*, according as the tumours attack the cellular tissue in common with the lymphatic glands, or the lymphatic glands only.

PROGNOSIS.—In acute glanders highly unfavourable. The disease is generally and speedily fatal. In chronic glanders more favourable. In farcy still more favourable.

TREATMENT.—No remedy has yet been discovered. The treatment must be that of typhus fever. The treatment of the local inflammation the same as in cases of dissection-wound.

PROPHYLAXIS.—Those who are employed in grooming horses affected by glanders should wear gloves, avoid contact with the diseased animal, and practise scrupulous cleanliness. Wounds or sores in grooms should, like dissection-wounds, be promptly treated by suction. Stables in which glandered horses have been kept should be thoroughly cleaned and fumigated, scraped and whitewashed, and harness and horsecloths either destroyed or exposed to a high temperature, and thoroughly washed.

2. *Chronic Glanders.*—In this form of the disease the local symptoms precede the febrile excitement, and the course of the malady more nearly resembles the effects of a dissection-wound. After a few hours from the introduction of the poison, the lymphatics of the wounded part become inflamed, and the inflammation extends along the fore-arm and arm to the axilla. The parotid and submaxillary glands may also be swollen and inflamed. Extensive abscesses form in the cellular tissue of the limb, and, in fatal cases, the pustular eruption, accompanied by dark bullæ, appears on the skin, followed by well-marked hectic fever. The duration of the fever is often very considerable, both in favourable and in fatal cases.

The term chronic glanders is used as synonymous with acute farcy, chronic farcy being a still milder and more protracted disease.

CHAPTER VI.

SCROFULA	King's Evil.
RACHITIS	Rickets.
MOLLITIES OSSIUM	Softening of the bones.
PURPURA	Scurvy.
RHEUMATISMUS	Rheumatism.
PODAGRA.	Gout.

SCROFULA—KING'S EVIL.

SYNONYM.—Struma.

DEFINITION.—A peculiar state of constitution, characterised by want of power and tone, the deposit of *tubercle* in several organs of the body, and a tendency to indolent inflammatory swellings and chronic ulcers.

The most common forms of scrofulous disease are, chronic inflammation and suppuration of the glands of the neck, strumous ophthalmia, and chronic ulcers of the cornea, porriginous diseases of the scalp, pustular eruptions about the ears and mouth, indolent abscesses of the skin, chilblains, enlarged tonsils, mollities ossium, diseases of the bones and joints, psoas abscess, tabes mesenterica, and pulmonary consumption. The scrofulous, too, are more subject than others to hysteria and to mental disorders.

The form of scrofula to be described in this place is that which attacks the absorbent glands of the neck. Other scrofulous affections will be treated of elsewhere in these pages (see Rachitis, Tabes Mesenterica, Phthisis Pulmonalis, and Strumous Ophthalmia), or in works on Surgery to which they properly belong.

SYMPTOMS.—Scrofula most commonly affects children of a lax habit of body, with a smooth soft skin, delicate rosy complexion, fair and fine hair, large blue eyes, with long silky eyelashes, full upper lip, and tumid septum and alæ nasi. A less common combination is the dark hair and olive complexion. It is also apt to attack spare, pale children, with projecting foreheads, misshapen heads, narrow and deformed chests, swollen fingers, enlarged joints, irregular and unsound teeth, and tumid abdomens. The most constant mark of the scrofulous diathesis is the thick upper lip. In addition to these marks of the scrofulous diathesis, may be mentioned a languid circulation, a slow and weak pulse, cold extremities, and great liability

to chilblains. A weak digestion, variable appetite, and torpid, or disordered bowels are also of frequent occurrence in scrofulous children. The subjects of this disease often display great acuteness and aptitude, with lively imaginations, and ardent affections, and not unfrequently a great precocity of intellect.

The scrofulous affection of the glands of the neck first appears as a slight swelling of one or more of the glands of one or both sides of the neck, especially of those situate beneath the lower jaw. The tumour is even to the touch, moveable, not tender, nor marked by any inflammation of the skin. Sometimes the swollen gland or glands will remain in this state without perceptible change for weeks, months, or even years; sometimes they undergo a very gradual enlargement; sometimes they coalesce, so as to form irregular knotty swellings; sometimes, under proper treatment, they gradually disappear. In a large proportion of cases they proceed to suppuration. The glands increase in size; the skin covering them, and the cellular membrane surrounding them, become thickened and inflamed; so that they become less moveable, and more tender to the touch. At length the tumour points, fluctuation is perceived, and unless relief be given by the knife, discharges through a single opening, or by several small apertures, pus, followed by a sero-purulent, mixed with a curdy or cheesy matter. The abscess thus formed heals slowly, has an unhealthy appearance, a dull-red colour, with hard, swollen, irregular edges, and an uneven base, clogged with curdy matter. When the ulcer heals, it leaves an irregular and unsightly scar. Though the superficial absorbent glands of the neck are those most frequently attacked, the deeper-seated glands are often implicated; and the disease sometimes spreads along the course of the absorbents from one gland to another.

The constitutional disturbance which accompanies these local changes is often slight. The patient retains his colour, does not lose flesh, and has every appearance of good health. In other cases, the departure from health is slight, consisting in general languor, some emaciation, defective or uncertain appetite, cold extremities, and languid circulation. When the local disease, however, is very extensive, and the glands suppurate, hectic fever sets in, with great debility and emaciation. In advanced stages of the disease, especially in young adults, pulmonary consumption may supervene; and the two diseases then run on together until they destroy the patient.

CAUSES.—*Predisposing.* Hereditary taint; syphilis or gout, or a shattered constitution in one or other of the parents; disparity of age in the parents, or too near relationship; childhood, youth, and the early adult age. The disease is of most common occurrence between the third and seventh year; it is comparatively rare after puberty, but may occur as late as thirty years of age. *Exciting.*—All causes of debility acting on the predisposed—such as sedentary habits of life; scanty and unwholesome food; the impure air of crowded and ill-ventilated nurseries, schools, workshops, and factories, and the confined

rooms inhabited by the poorer classes in towns; want of cleanliness; over-work; bad water; damp and low situations; the seasons of winter and spring; exhausting maladies, especially fever and the febrile exanthemata. The immediate exciting cause is often an attack of catarrh.

DIAGNOSIS.—From simple glandular inflammation, by the indolent character of the swellings. From malignant diseases of the same parts, by the appearances just described, and by the early age at which scrofula sets in.

PROGNOSIS.—The disease, when limited to the absorbent glands, is rarely fatal, but other scrofulous affections, such as tabes mesenterica in childhood, white swelling of the joints, disease of the spine, and pulmonary consumption in the young adult, are dangerous and fatal maladies. Scrofula is always slow and tedious in its course, and very uncertain in its duration.

POST-MORTEM APPEARANCES.—The glands themselves contain a soft curdy matter. The other viscera of the body, especially the mesenteric glands and the lungs, contain tubercular deposits. Scrofulous disease of the joints and bones is also not of uncommon occurrence.

TREATMENT.—*Indications.* I. To improve the general health. II. To promote the absorption or dispersion of local tumours, and the healing of ulcers.

I. The first indication may be fulfilled by—

A nutritious diet, adapted to the age of the patient, with a due allowance of animal food. The use of animal food, however, is not always indicated, and frequently does irreparable mischief, especially in very young children, and in the subjects of tabes mesenterica. During the stage of suppuration, a more generous diet will be necessary, and wine and malt liquors in moderate quantity may be given with advantage. In scrofulous infants brought up by hand, the substitution of the mother's milk, or of pure milk from the cow.

Daily exercise, short of fatigue.

Warm clothing (flannel or woven cotton next the skin, avoiding over-clothing).

Change of air, especially from a low, damp situation to a high, dry, and bracing air. Sea-air and sea-bathing in the summer and autumn months.

Daily ablution of the skin with cold or tepid water, followed by friction with a rough towel, or the shower-bath once or twice a-week, and an occasional warm bath, to insure perfect cleanliness, and an open state of the pores of the skin.

The state of the bowels must be carefully attended to, and gentle aperients must be administered at short intervals. A few grains of rhubarb, with small doses of hyd. c. cretâ may be given every night, or every other night, followed by a tea or dessert spoonful of castor-oil the following morning.

If the patient suffers from heartburn and other symptoms of indi-

gestion, the aperients may be combined with alkalis, such as the carbonates of magnesia or soda; or the liq. potassæ may be given in any of the tonic infusions.

Tonics, of which the preparations of *iron* are to be preferred, especially when the patient is habitually pale and languid. The vinum ferri, the tinctura ferri sesquichloridi, the ammonio-chloride, the citrate and ammonio-citrate, and the dried sulphate, are suitable preparations. Decoction of bark, or quinine, may also be given, or quinine and iron in combination.

Iodine in the form of iodide of potassium (one to three grains three times a-day in some tonic infusion), or the same in combination with some of the liquid preparations of iron, or the iodide of iron in doses of from one to three grains, three or four times a-day.

The decoction of sarsaparilla may be given at the same time with the tonic medicines.

Cod-liver oil (a tea-spoonful three times a-day, gradually increased to a table-spoonful) is a valuable remedy in scrofula.

Occasional symptoms must be met by appropriate remedies in smaller doses than in patients of more robust constitution. As a general rule, general and local abstractions of blood, and all lowering measures must be carefully avoided; but leeches in small numbers may be occasionally necessary in that condition of the swellings in which there is reason to hope that by keeping down the inflammation of the skin, suppuration may be prevented.

II. Simple enlargement of the glands of the neck may be treated by the constant application of the emplastrum ammoniaci c. hydrargyro, or they may be painted frequently with iodine paint. (Iodine ʒi., iodide of potassium ℈ii., rectified spirits of wine ʒi.) If the patient is at the sea-side, poultices of sea-weed (the fucus vesiculosus) may be kept constantly applied. When suppuration takes place, it must be encouraged by poultices, and the matter be let out by a small vertical or oblique incision. Caustic should never be used for this purpose, as it leaves behind it unsightly scars.

Open scrofulous ulcers generally put on an indolent character, and must be treated by local stimulants, and in extreme cases by caustics. In the treatment of other local affections occurring in scrofulous habits this peculiarly indolent character must be borne in mind.

Remedies.—*Mercurial preparations, given as alteratives,* such as Plummer's pill, or the bichloride of mercury with sarsaparilla (Hydrarg. bichloridi, gr. $\frac{1}{20}$; decoct. sarsæ ℥iss., or syrupi sarsæ ʒi. three times a-day). *The decoctions of sarsaparilla, guiacum, sassafras, and mezereon. Medicines containing iodine in small quantities;* of which the one most in repute is the burnt sponge in doses of ʒi. to ℥ss. *Alkalis and alkaline earths,* of which the best is the liquor potassæ, in doses of from five to twenty drops, three times a-day in some tonic infusion; or lime-water in doses of from one to two drachms. *The mineral acids,* especially the nitro-muriatic acid. *The chlorides of Barium and of Calcium.* (Liquor barii chloridi. ♏iii. to

m v, cautiously increased; or Liquor calcii chloridi, m xxx. to m xl. gradually increased.) *Extract of Conium.*

From the slow progress and uncertain march of scrofulous affections, many remedies seem to be serviceable which are really inert. In this respect scrofula resembles pulmonary consumption. The most opposite remedies are confidently recommended and thought to be efficacious.

RACHITIS—RICKETS.

DEFINITION.—A distortion of the bones, occurring in infancy and childhood, from a deficiency of earthy matters, and of the more essential animal matters of the bony structure.

SYMPTOMS.—The disease sometimes begins soon after birth; more frequently when the child is five or six months old; more frequently still before the close of the second year. After this time it is very rare. When the disease first sets in, the child is observed to be less healthy and strong than children of the same age. The face is pale, and the body emaciated. Teething begins late, and goes on slowly, and the teeth soon become loose and carious. The fontanelles and sutures are usually open, the head, though smaller than usual, is generally large in proportion to the face, and the forehead prominent; the chest is flattened at the sides, and the sternum projecting, the epiphyses of the long bones become spongy, and the joints swell. This enlargement of the joints is commonly first perceived in the wrists and ankles. As the disease advances, the long bones yield to the weight of the body, and are twisted by the action of the muscles; the spine becomes curved and bent; and the pelvis is distorted and narrowed. If the patient has begun to walk, his gait is unsteady and waddling. The mental faculties, except in cases of cretinism of which distortion of the bones forms a part, are unimpaired, and even more acute than in children of the same age.

CAUSES.—*Predisposing.* Hereditary predisposition. A peculiar diathesis, allied, perhaps, to the scrofulous, but not identical with it; for neither enlargements of the cervical glands, nor tuberculous deposits in the lungs, are of common occurrence in ricketty subjects. *Exciting.* —Bad nursing, bad food, bad air, want of cleanliness.

PATHOLOGY.—Defective nourishment, or mal-assimilation of the food, leading to a deficiency of earthy matter in the structure of the bones, and to a deficiency or entire absence of chondrin and gelatine.

PROGNOSIS.—*Favourable.* The disease is very rarely fatal. In mild cases complete recovery often takes place; the swollen joints gradually returning to their natural size: in severe cases the distortion of the body is permanent, but the bones ultimately resume their normal composition, and even become more dense and compact than in persons originally healthy.

TREATMENT.—*Indication.* To preserve and improve the general health by every possible means. By food of good quality and adapted to the child's age; by substituting the mother's milk, or new milk from the cow, for other food, in infants brought up by hand; by fresh and pure air, cleanliness, exercise in the open air, cold or tepid salt-bathing, and frequent frictions. Also by tonics, especially preparations of steel, such as steel-wine, in doses of a tea or dessert spoonful, three or four times a-day, or the sulphate or potassio-tartrate of iron. Cod-liver oil in doses of from a tea-spoonful to a table-spoonful three times a-day, may also be prescribed with advantage. Children living in large towns should be removed to the country. The state of the bowels should be carefully attended to. The distorted limbs mus be supported by padded splints, or such other mechanical contrivances as do not interfere with the proper action of the muscles; and care should be taken not to allow the weight of the body to rest on those parts which show a tendency to swell or bend.

MOLLITIES OSSIUM—SOFTENING OF THE BONES.

SYNOMYMS.—Osteo-malacia. Atrophy of bone.

SYMPTOMS.—The symptoms of this disease are very obscure, and its presence is rarely recognised till it has made considerable progress. Severe and long-continued pains in the pelvis and lower extremities, considered as rheumatic pains, have been present in the greater number of cases; but the disease is generally recognised for the first time by a fracture occurring in one of the bones of the extremities by the application of some very slight force; or by the bending, twisting, or distortion of one or other of the limbs; or, in females, by the increasing difficulty of parturition, arising from a growing distortion of the pelvis.

ANATOMICAL CHARACTERS.—The cancelli of the bone completely absorbed, and the bone reduced to a mere shell, filled with medullary matter. The bones so softened as to admit of being cut with a knife. The periosteum sound. The teeth not implicated.

CAUSES.—*Predisposing.* The female sex. It is comparatively rare in men. The adult age. *Exciting.*—Obscure.

DIAGNOSIS.—From rachitis by the age of the patient; rachitis is a disease of infancy and childhood, mollities ossium of adult age.

PROGNOSIS.—Unfavourable; but the disease often makes slow progress.

TREATMENT.—There is no remedy or mode of treatment on which reliance can be placed. The treatment will, therefore, have to be directed to the improvement of the general health, by nourishing diet and tonic remedies, with such other medicines as are indicated by the existing state of the system.

PURPURA—SCURVY.

SYNONYMS.—Hæmorrhœa petechialis. Petechiæ sine febre.

VARIETIES.—1. *Purpura simplex;* 2. *Purpura urticans;* 3. *Purpura hæmorrhagica,* or land-scurvy; 4. *Purpura nautica,* or sea-scurvy.

1. PURPURA SIMPLEX.

SYMPTOMS.—After slight uneasiness, or trifling giddiness, an eruption of small round patches, of a dark-red colour, chiefly on the thighs and legs, but sometimes extending over the whole body. After a few days, the first patches begin to fade, and new ones appear. There is little disturbance of the general health. The disease may last from three or four weeks to as many years.

CAUSES.—*Predisposing.* Peculiarity of constitution, debility.—*Exciting.* Febrile states of system. It is often attributed to cold.

DIAGNOSIS.—From other forms of skin disease, by the shape and colour of the spots, and the uninjured state of the cuticle.

PROGNOSIS.—Favourable.

TREATMENT.—A nourishing *mixed* diet, and proper exercise, with tonic medicines and occasional mild aperients. If the disease do not yield to this treatment, the same remedies, with small bleedings from the arm, to promote the absorption of the effused blood.

2. PURPURA URTICANS.

This is a form of skin disease closely allied to urticaria, and consisting in a discoloration of the patches of nettle-rash by blood poured out in small quantity into the cellular tissue. (See *Urticaria.*)

3. PURPURA HÆMORRHAGICA—LAND-SCURVY.

SYMPTOMS.—Weakness, lassitude, and pains in the limbs, with a feeble pulse of variable frequency; petechiæ of larger extent than in the first variety; occasionally bullæ filled with liquid blood; gums swollen, livid, and spongy; hæmorrhage from the gums, nostrils, and mucous membranes generally; rigidity of the legs from effusion of blood into the texture of the muscles; extensive bruises. In severe cases, all the symptoms of sea-scurvy.

RATIONALE.—A febrile state of system, with a relaxed and weakened state of the capillary vessels; or general debility, combined with the same condition of vessels.

CAUSES.—*Predisposing.* Moist atmosphere, impure air, want of personal cleanliness, overcrowding, and the general causes of debility. The fatigues and privations of military service.—*Exciting.* A diet deficient in nutriment, consisting chiefly of one kind of food, or wanting a due admixture of vegetable acid, or, according to a recent theory, wanting in potass.

TREATMENT.—If the pulse be full and hard, the treatment should commence by bleeding from the arm to the extent of ten or twelve ounces. A generous mixed diet, with an allowance of wine or beer, must be prescribed, with tonics or stimulants, according to the degree of the debility. A table-spoonful of lemon-juice may be given with advantage three or four times a-day.

PROPHYLAXIS.—When purpura hæmorrhagica breaks out in prisons or workhouses, minute inquiries should be made as to the diet of the inmates. It may not be deficient in quantity or in the quality of the articles of which it consists, but it may be wanting in the essential element of vegetables containing an acid. For instance, scurvy has been traced in one case to the substitution of rice, which does not contain such an acid, for the potato, which does contain it; and the restoration of the potato sufficed to banish the disease. As the cheapest of vegetables, answering to this description, the potato should always form part of the ordinary diet of prisons, workhouses, and hospitals.

4. PURPURA NAUTICA. SCORBUTUS—SEA-SCURVY.

SYMPTOMS.—Heaviness, weariness, dejection of spirits, aversion to exercise, dull pains in the limbs, especially during the night; anxiety and oppression at the præcordia; palpitation and shortness of breath on the slightest exertion; the countenance pale, sallow, and bloated; the skin in some cases hot, in others cold and contracted; the pulse in some cases infrequent, in others small and frequent; the tongue clean, moist, and pale; the gums swollen, spongy, and livid, bleed upon the slightest touch, and at length separate from the teeth, which become loose; the breath offensive; petechiæ and maculæ appear on various parts of the body; the slightest scratch degenerates into a foul and ill-conditioned ulcer; the slightest pressure produces a bruise, and old cicatrices open afresh, and discharge a thin sanious fluid; spontaneous ulceration likewise takes place upon the gums and upon the surface of the body; the joints become swelled and stiff; the muscles of the legs, and the muscles of the calf especially, rigid, contracted, and exceedingly painful; the bowels are either obstinately constipated, or there is diarrhœa; the urine, when not tinged with blood, is transparent, high-coloured, and acid; great emaciation ensues; passive hæmorrhages take place from the gums, nose, and ears, from the stomach and bowels, and occasionally from the lungs and bladder; all the excretions become intolerably fœtid; but the appetite frequently remains entire, the patient retains his intellectual faculties, and talks with a loud voice, but is apt to faint on the slightest motion; and many patients have expired as they were being carried from their hammocks. Sudden death has also often taken place in the earlier stage of the disease, during some violent effort.

CAUSES.—*Predisposing.* A cold moist atmosphere; sleeping in damp clothes or beds; the winter season; cold climates; fatigues and hardships; preceding attacks of illness; a previous attack of scurvy; indolence; depressing passions, and the general causes of debility;

scanty supplies of water; deficient clothing, want of cleanliness; impure air.—*Exciting.* A diet restricted to a few articles of food, such as salt meat and biscuit; a deficiency of vegetable food, and especially of vegetable acids, or of potass and its salts.

DIAGNOSIS.—*From malignant fever.* By the absence of feverish symptoms; by the intellectual faculties being little impaired; by the disease coming on more gradually, and continuing a much longer time; by the circumstances under which it occurs; by its not being contagious. Between this disease and *Purpura hæmorrhagica* there is no essential difference. The scurvy, as it formerly occurred on land, in besieged cities, in camps, and in monasteries, and occasionally among entire populations, and as it now shows itself from time to time in prisons and workhouses, is essentially the same disease as when it occurs at sea.

PROGNOSIS.—Generally favourable if a proper vegetable diet, or other proper substitute, can be obtained.

Favourable circumstances.—The constitution not having been weakened by previous disease; little reduction of strength; moist skin; bilious diarrhœa; the patient being still capable of moving about; infrequent pulse; the petechiæ, if any appear, being of a bright-red colour; the absence of ulceration.

Unfavourable.—Great prostration of strength; extreme oppression at the præcordia; redness of the eyes and flushed countenance; a rapid weak pulse; profuse hæmorrhages; petechiæ and maculæ of a dark-livid colour, and of great extent; fœtid and involuntary evacuations.

TREATMENT.—*Indications.* I. To supply what is wanting in the diet. II. To palliate urgent symptoms.

I. The first indication is fulfilled by fresh vegetables; the ascescent fruits, as the orange, the lime, and the lemon; fermented and fermenting spirituous liquors, as ale, cyder, and spruce beer, and the light French and German wines. Where great debility is present the stronger spirits may be given, in combination with a vegetable acid, as in punch. The salts of potass, such as the tartrate, acetate, chlorate, phosphate, and bicarbonate, may also be given with advantage.

Occasional aperients of infusion of tamarinds, cream of tartar, or the sulphates of soda and magnesia may be given, and the utmost attention must be paid to cleanliness and ventilation.

II. The second indication. *Ulcerations of the gums* require astringent gargles of alum, muriatic acid, chloride of soda or of lime, or decoction of bark; or the steam of vinegar. *Acute pains* are relieved by opium; *oppression at the chest and difficulty of breathing*, by diffusible stimulants, such as nitric, sulphuric, or chloric æther with camphor; *contractions of the muscles of the legs*, by hot fomentations of vinegar and water, or emollient cataplasms, and by friction; *scorbutic ulcers* upon the surface of the body by slightly-stimulant applications.

PROPHYLAXIS.—A due admixture with the food of such fresh or

preserved vegetables as contain vegetable acids, or where these cannot be procured, lime-juice, lemon-juice, or citric acid. Among fresh vegetables, the potato is one of the best. As a moist atmosphere is undoubtedly injurious, dry rubbing should be substituted for frequent washing in our ships. Cleanliness and ventilation should also be rigidly enforced; and where men are placed in circumstances favourable to mental inaction and despondency, such employments and amusements as tend to counteract these states of mind.

RHEUMATISMUS—RHEUMATISM.

SPECIES—1. Acute. 2. Chronic. 3. Muscular.

1. RHEUMATISMUS ACUTUS—RHEUMATIC FEVER.

DEFINITION.—Acute inflammation of the larger joints, accompanied by well-marked febrile symptoms; the inflammation often shifting from joint to joint, and, in many cases, attacking the fibrous textures of the heart.

SYNONYMS.—Acute rheumatism—acute articular rheumatism—acute arthritis.

SYMPTOMS.—The disease generally sets in soon after exposure to cold and wet, with all the symptoms of a severe attack of catarrh; the pain in the back and limbs being unusually severe, and accompanied by a sensation of coldness and stiffness. After a short time (in the course of one, two, or three days) inflammation shows itself in one or more of the larger joints of the body, characterised by redness and heat of surface, acute pain, extreme tenderness, tumour, and tension. There is great constitutional disturbance, with extreme restlessness, intense thirst, and loss of appetite. The pulse ranges from 90 to 120; and is full, hard, and jerking; the blood, drawn from a vein, is cupped and buffed; the tongue is coated with a white fur; the body is usually obstinately costive; the urine is scanty and high-coloured, and has a strong acid reaction, but at this period of the disease is generally free from sediment. The skin is often bathed in a profuse acid-sweat, which, however, affords no relief. The febrile symptoms and the pain generally suffer an exacerbation at night.

The disease is rarely confined to the joints first attacked; but after some hours or days, it attacks fresh joints, sometimes continuing unabated in those first affected, at others leaving them quite free from pain and swelling. In rarer instances, it returns to the joints first affected, and ultimately extends to all the large joints of the body. Some amendment usually takes place at the end of about a fortnight; the pain lessens, especially at night; there is less fever, and less perspiration; the urine is more abundant, and lets fall a copious deposit of the mixed urates; the appetite returns; the thirst diminishes; the pulse falls; and the patient's movements become more free. Con-

valescence, however, is rarely uninterrupted, and the affection of the joints often assumes a chronic form.

In a large proportion of cases, the disease extends to the fibrous tissues of the heart. The symptoms which denote this formidable complication are dyspnœa, palpitation, and a sense of oppression, increased by pressure in the intercostal spaces, by inspiration, and by lying on the left side. In some cases pain in the region of the heart is superadded. The countenance wears a peculiar listless expression. The pulse is generally quickened, and has a peculiar thrill. As this affection is often obscure, it should be carefully sought for.

For the stethoscopic indications, see Diseases of the Heart, Carditis, Pericarditis, &c.

Sometimes, too, the disease is complicated, and recovery retarded by attacks of bronchitis, pneumonia, or pleurisy; by inflammation of the brain and its membranes; and by inflammation of the sclerotic coat of the eye. In young females it is sometimes complicated with chorea.

ANATOMICAL CHARACTER.—Inflammation of the *fibrous* tissues of the parts affected, generally terminating in resolution, but sometimes ending in chronic inflammation, and more rarely in deposits of lymph, and consequent permanent stiffening of the joints. In the heart the morbid appearances described under Carditis and Pericarditis.

PATHOLOGY.—The disease is believed to depend on an excess of lactic acid in the blood.

CAUSES.—*Predisposing.* Previous attacks. Youth. Debility. Spring and autumn. *Exciting.*—Exposure to wet and cold.

DIAGNOSIS.—The pathognomonic symptoms of the acute form are inflammatory fever, with pains and inflammation of the larger joints, over which the integuments become distended, smooth, and of a peculiar pale-red colour.

From Podagra (see Podagra). From *Neuralgia*, by the history of the case; by the presence of inflammation and fever; and by the fact that, in neuralgia affecting the same parts, the pain is generally confined to a single joint. From *Periostitis*, by the extreme tenderness on pressure of the inflamed portion of bone in that disease; and by its occurrence in the bones of the cranium, on the sternum, or on the shin-bone, as well as in the bones forming the large joints; also, by the previous history of the case.

PROGNOSIS.—*Favourable symptoms.* A general, but not unnaturally profuse, perspiration; the repeated or continuous deposit of a lateritious or furfuraceous sediment in the urine; eruptions on the skin;—moderate hæmorrhage of florid blood from the nose or other parts. *Unfavourable.* Metastasis of the inflammation to the heart, chest, or brain. The disease is very rarely fatal; but often leaves behind it organic disease of the heart by which life is shortened, or chronic inflammation of the joints, with a great susceptibility of future attack. In favourable cases, and in persons otherwise of good constitution, the duration of the disease is from three weeks to a month.

TREATMENT.—Many different modes of treatment have been recommended and practised in acute rheumatism. Three plans of treatment are especially deserving of attention. 1. The treatment by alkalis. 2. The treatment by lemon-juice. 3. The treatment by bleeding and quinine.

1. *Alkalis.* From half a drachm to two scruples of the bicarbonate of potass may be given, dissolved in an ounce and a half of water, every two hours. (Dr. Garrod.) The results of this treatment seem to be highly favourable. The nitrate, bitartrate, acetate, and chlorate of potass, and the carbonate of soda, have also been given with advantage.

2. *Lemon-juice.* The juice may be given in doses of from half an ounce to an ounce, three times a-day. (Dr. Owen Rees.) The evidence respecting this mode of treatment, though conflicting, is on the whole favourable.

3. *Bleeding and Quinine.* This is a modification of the treatment by bleeding and bark. A single full bleeding is to be followed up directly by sulphate of quinine in two-grain doses every three hours. In favour of this mode of treatment there is also strong evidence, and it is one which I have seen adopted and have frequently practised with advantage. (G.)

The adoption of either of these methods of treatment does not preclude the use of other means in cases of unusual severity, or of a complicated character. The remedies which have to be considered are—1. Bleeding. 2. Aperient medicines. 3. Warm baths; and 4. Local applications.

1. *Bleeding.* This remedy is either followed immediately by quinine or bark, as in the third method of treatment, or it is resorted to under the erroneous idea that the inflammation of the joints is of the character of common inflammation. With whatever view adopted, general bleeding should be had recourse to only at the onset of the disease, and in those cases only in which the vascular action is strong, the heat considerable, the constitution robust, and the patient not advanced in years. It may be repeated if the symptoms continue violent; but the repetition is to be regulated by the effect produced, and not by the cupped and buffed appearance of the blood, which, in many cases, continues to increase, notwithstanding the abstraction of blood. Local abstraction of blood, by leeches or cupping, may be employed when there is considerable pain and tumefaction about a joint or limb.

2. *Aperient Medicines.* These medicines should also be given early in the disease, whatever the mode of treatment adopted. A brisk mercurial purgative followed in the morning by a saline aperient may be given daily at the onset; the aperient being combined with opium if there is much pain and restlessness. (℞. Hydrarg. chloridi, Ext. colocynthidis c. āā gr. iii., Pulv. opii, gr. i., in two pills, every night.)

3. *The warm bath* may be used with advantage before the pain in the joints has become so severe as to create difficulty in moving the

patient. When the disease is beginning to abate, it may also be administered two or three times a-week. Carbonate of soda may then be added to the bath in sufficient quantity to render it decidedly alkaline.

4. *Local applications.* The affected joints should be enveloped in cotton wool. When the skin perspires profusely, and the surface is very hot, cloths dipped in an alkaline lotion (Potassæ carb. ℥ss. Aquæ Oss.) and covered with oilskin, may be substituted; or, if the pain is very acute and the patient restless, cloths dipped in a lotion consisting of chloroform ʒi. and water ℥i. Small blisters applied to the joints successively affected, sometimes give relief.

When the disease is complicated with heart-affection, cupping, followed by blisters to the region of the heart is indicated; or, if the patient is very weak, a large blister, dressed with mercurial ointment, at the same time that calomel and opium are given with a view to affect the system. (℞. Hydrarg. chloridi, gr. iii. or Pil. hydrarg. gr. v., Pulv. opii, gr. ¼ every three or four hours); or we may give at intervals of three or four hours a combination of tartar emetic, digitalis, and opium (Vin. antim. pot. tart. f. ʒss., Tinct. opii, ♏v. vel ♏x., Tinct. digitalis, ♏x.) The effect of the digitalis on the circulation to be carefully watched, and the dose increased or lessened according to circumstances.

Remedies.—Calomel and opium; calomel in large doses (gr. x.) at night, and the black draught in the morning; tartar-emetic and opium; digitalis in full doses (♏ xx.); veratria in doses of the twelfth of a grain, cautiously administered, and closely watched; colchicum, either alone or in combination with opiates; nitrate of potash, in full and repeated doses; the same remedy in combination with tartar-emetic; local tepid baths, with poultices to the inflamed joints in the intervals, but no medicine.

2. CHRONIC ARTICULAR RHEUMATISM.

Symptoms.—The chronic form of rheumatism may be a consequence and termination of the acute, or it may be independent of it. In the first case, the affected joints are left weak, stiff, and, in some instances, œdematous; and the pain, which was before shifting, is now usually confined to particular joints. Sometimes, however, it still shifts from joint to joint, but is not attended by acute inflammation or fever. Exposure to wet and cold will often bring on an attack, which continues for a considerable time, and at length goes off, leaving the affected joints weak and stiff.

Chronic articular rheumatism, when not a sequel of the acute disease, generally attacks the smaller joints of the hands and feet, and is then commonly called rheumatic gout.

When the disease is confined to one or two joints, local applications are indicated; leeches on every marked return or increase of inflammation; blisters at a short distance from the affected joint, or even to the joint itself; and friction. Where there is much effusion about

the joints, electricity or electro-magnetism may be advantageously employed. Where the disease is more extensive, we must employ general remedies to the exclusion of local ones. The vapour-bath is amongst the most powerful of these remedies. The warm bath is of less efficacy, but the thermal mineral waters of Vichy, Aix-la-Chapelle, Karlsbad, Wiesbaden, &c., have long enjoyed a high and deserved reputation in the treatment of chronic articular rheumatism. A warm climate also proves beneficial to cases which have arisen in a cold one, though warm climates are peculiarly favourable to the occurrence of rheumatic affections.

REMEDIES.—Dover's powder in repeated small doses (gr. v. three times a-day); Vinum colchici (ℳ xx.) in combination with opium (Tinct. opii, ℳ v.); guiacum, in the form of decoction, or ammoniated tincture; the iodide of potassium (gr. iii. to gr. v.) with sarsaparilla (especially indicated where there is a syphilitic taint).

3. MUSCULAR RHEUMATISM.

Varieties.—Some forms of the disease have distinct names, according to the seat of the affection; as *pleurodyne*, when it attacks the muscles of the side; *lumbago*, when the seat is in the loins; *crick in the neck*, when it affects the neck. Rheumatism of the muscles of the back of the thigh is sometimes, though incorrectly, called *sciatica*.

SYMPTOMS.—Pain, varying in character and severity, from a dull aching to the most acute lancinating pain, affecting the entire body, the trunk, a single limb, or a single muscle or group of muscles; coming on sometimes suddenly, at others after shivering and slight feverishness: often forming the most distressing feature of a common cold, and remaining after the other symptoms have vanished. The muscles are also the seat of the severe pains in the chest and abdomen which accompany spinal irritation. (See Spinal Irritation.)

PROGNOSIS.—*Favourable.* The disease is free from danger. Its duration may vary from a few hours or days to as many months or years. The general health is little if at all affected.

DIAGNOSIS.—The pain is increased by motion of the affected part, by percussion with the points of the fingers, and by the sudden removal of pressure; but it is relieved by firm pressure gradually applied. It is sometimes augmented, sometimes relieved, by the warmth of bed. When increased by warmth, it is called *acute;* when relieved by it, *chronic.*

TREATMENT.—The *acute* form of rheumatism, which is increased by the warmth of bed, requires colchicum and opium, with aperients, as in the following prescription, which may be taken three times a-day:—℞. Vin. colch. ℳ xx. Tinct. opii ℳ v. Magnes. carb. gr. x. Magnes. sulph. ʒi. Aquæ ℥iss.; together with the occasional use of the warm bath. When the affection is of limited extent and of great severity, we may resort to local depletion by cupping or leeches, to the

belladonna plaster, or to friction with an opiate liniment. Veratria ointment has been recommended, but must be used with caution.

The *chronic* form is best treated by guaiacum in combination with stimulants, in the form of the tinctura guaiaci ammoniata. The phosphate of ammonia, in ten-grain doses in some tonic infusion three times a-day, has been recommended by Dr. Edwards. The local applications consist of frictions with stimulating embrocations, blisters, dry cupping, and acupuncture. The latter remedy has often effected a cure of severe and lingering attacks, especially of lumbago. Electricity has also been used with advantage. Another local application which often proves serviceable in muscular rheumatism is heat applied by means of an iron dipped in boiling water, and of a shape adapted to the part attacked.

PROPHYLAXIS.—Persons subject to rheumatism should wear flannel or cotton next the skin; they should protect the parts most liable to the disease; and avoid exposure to wet and cold.

PLEURODYNE.

This is a very common affection. Pain in the left side is present in almost all the functional diseases of young and middle-aged females; in dyspepsia, amenorrhœa, menorrhagia, leucorrhœa, hyperlactatio, and chlorosis, and in debility, however induced. In males it is equally common on both sides. Acute pain in the muscles of the left side generally precedes by some days or weeks the appearance of shingles. (See Herpes Zoster.)

CAUSES.—*Predisposing.* Debility. *Exciting.*—Over-exertion, as in the effort of coughing, and distension of the stomach with flatus.

DIAGNOSIS.—The *diagnosis* of pleurodyne is of great importance, though the disease itself is of little or none. It is distinguished from pleuritis, with which it is often confounded, to the great injury of the patient, by the absence of the constitutional symptoms of the acute phlegmasiæ, and of the stethoscopic indications of pleurisy; by being increased by motion of the affected parts, as in raising the arm, or twisting suddenly round, or by a sudden inspiration or expiration, by the effect of sudden and slight percussion with the points of the fingers, and by the immediate increase of the pain on the removal of pressure. It is distinguished from the neuralgic pain preceding the eruption of shingles by its less severity.

COMPLICATIONS.—With chest disease (for it is a common consequence of a cough); with acute dyspepsia; and with any of the debilitating diseases mentioned above.

TREATMENT.—The emplastrum belladonnæ, or the emplastrum saponis c. opio; or, in mild cases, the common emplastrum roborans should be applied to the seat of the pain; in more severe cases, a blister, with the internal administration of colchicum. Symptomatic pleurodyne must be treated by removing its cause.

Allied to pleurodyne is an acute pain of the muscles of the abdomen or diaphragm, or of both together. That of the abdomen is apt to be confounded with peritonitis, as pleurodyne with pleurisy. The diagnosis is easy. Graduated pressure gives relief, except when a sudden expiration throws the muscles into action; but the sudden removal of pressure, percussion with the points of the fingers, and sudden motion of the part affected, increase the pain. The absence of severe constitutional symptoms will assist the diagnosis, as will also the kind of respiration. In pleurodyne, the respiration is abdominal; in rheumatism of the muscles of the abdomen, thoracic. When the diaphragm is affected, the respirations are short and catching, and accompanied with acute suffering.

Muscular rheumatism also attacks internal viscera, as the muscular texture of the heart, causing violent palpitation; the muscular coat of the œsophagus, giving rise to much pain in swallowing; and the muscular substance of the impregnated uterus leading to severe pains, similar to labour pains. Many internal muscular pains are connected with flatulence, or are symptomatic of dyspepsia.

LUMBAGO.

This disease occupies the mass of muscles in the loins, and, when severe, confines the patient to bed, or obliges him to walk carefully with crutches, or with the assistance of others. The slightest motion causes excruciating agony.

DIAGNOSIS.—From *the pains in the back which accompany the cold stage of febrile disorders*, by the effect of motion, which increases the pain of lumbago, but has no effect on febrile pains. From *disease of the kidneys*, by the urine remaining unchanged in character, or yielding merely the common deposits; and by the absence of symptoms of disease of the kidney. Transient and severe attacks of rheumatism in a single muscle or group of muscles sometimes pass off, after lasting a few hours or a day, by a copious red sediment in the urine. From *lumbar abscess*, by the absence of rigors, and of hectic fever, and by the negative results of a careful examination of the part affected. [It should be borne in mind that collections of matter in the muscles of the back may *point* at the lower part of the back itself, at any part of the abdominal parietes, or below Poupart's ligament.]

TREATMENT.—The general treatment is that of other forms of muscular rheumatism (see *supra*). The local treatment consists in cupping to the loins, or in dry cupping, if the pain is very severe, followed by the emplastrum belladonnæ. In less severe cases, a liniment containing laudanum (Liniment. saponis, or Liniment. camph. f ℥vss. Tinct. opii f ℥ss) may be rubbed into the seat of the pain three or four times a-day; or the Emplast. saponis c. opio, or Emplast. picis C. may be kept applied to the back.

PODAGRA—THE GOUT.

VARIETIES.—1. Regular gout; 2. Misplaced gout; 3. Atonic gout; 4. Retrocedent gout.

SYMPTOMS.—The first paroxysm of gout generally comes on about two o'clock in the morning, with pain in the ball of the great toe of one foot (more rarely in the heel, ankle, or instep), accompanied by rigor, followed by feverish heat. The pain increases in violence till it becomes perfectly excruciating, and is accompanied by extreme restlessness. The joint is, at the same time, exquisitely tender, so that the patient cannot bear the weight of the bed-clothes, or the slightest jar or movement in the room. The pain having attained its acmé towards the following evening, ceases sometimes suddenly, sometimes gradually, about midnight; a general moisture breaks out upon the skin, the patient falls into a sound sleep, and in some cases wakes free from pain. But in the majority of cases, the patient, on awaking next morning, finds the parts, before so painful, swollen, of a deep red colour, tense and shining, the surrounding parts œdematous, and the vessels turgid. For several days and nights the same round of symptoms occurs in a mitigated form, till at length the redness and swelling subside, the skin desquamates, and the joint is either restored to its healthy state, or becomes the seat of the chronic form of the disease.

It rarely happens that one fit of gout is not followed, at a longer or shorter interval (sometimes of months, sometimes of years), by a second attack. Most patients indeed have several successive attacks, which at first occur at the same season of the year, but at length take place very frequently, extending first to both feet simultaneously or in succession, then to the hands, and at length to almost all the joints. These subsequent attacks set in at all hours of the day and night, commence sometimes in the hand, sometimes in the foot, sometimes in the great toe or thumb, in other instances in the joints of the wrist or ankle. They are attended with less pain, but with more constitutional disturbance. At length, after repeated attacks, the joints become stiff, and in many cases they are the seat of chalky deposits.

The fits of gout sometimes appear without distinct premonitory symptoms, but they are generally preceded by dyspepsia, with its usual attendants, dejection of spirits, and irritability of temper; or by unusual coldness and numbness of the extremities, alternating with a sense of pricking, or formication, frequent cramps, and unusual turgescence of the veins of the leg.

When the gouty diathesis prevails in the system, but, without producing the usual inflammatory affection of the joints, it often appears as an affection of some internal part. If it attack the *stomach*, it occasions pain, nausea, vomiting, eructations, and dejection of spirits; frequently accompanied by pains and cramps of the trunk and upper extremities. Sometimes there is obstinate costiveness, sometimes

diarrhœa. If the *heart* is attacked, palpitation, syncope, and angina are the symptoms present; if the *lungs*, dyspnœa, asthma, and sometimes a persistent spasmodic cough. When *the head* is affected, there are headache and giddiness, followed sometimes by apoplectic and paralytic affections. When it attacks the *spinal cord*, it gives rise to severe neuralgic affections, terminating in paralysis. These gouty affections of internal parts, without inflammation of the joints, have been termed *misplaced* gout, or *atonic* gout, on the supposition that the system had not strength to throw the disease out.

Sometimes the inflammation of the joints having come on in the usual manner, but without attaining the usual severity, or continuing for the customary time, suddenly ceases, while the disease is transferred to some internal part. This is called *retrocedent* gout.

PATHOLOGY.—A blood disease, caused directly by an excess of uric acid in the blood, and remotely by dyspepsia.

CAUSES.—*Predisposing and remote.* The male sex; the adult age, and particularly the middle period of life (it seldom occurs before the age of puberty, and in a large proportion of cases makes its first attack between 30 and 40); hereditary predisposition; plethora; a full diet of animal food; fermented and especially malt liquors; acid and acescent wines; a sedentary and studious life; dyspepsia. Gout is not peculiar to the rich, but often affects poor persons of temperate habits after a period of privation.

Exciting.—Cold to the extremities; fatigue; anxiety of mind; excessive evacuations; sprains and blows; intemperance; the ceasing of usual labour; a sudden change from a full to a spare diet; the suppression of customary evacuations, as of the piles, which are common in gouty persons.

DIAGNOSIS.—From *rheumatism*, by the seat of the disease being the smaller joints, especially the great toe, while rheumatism attacks the larger joints. By the more intense colour of the inflamed part. By its more sudden attack. By the more frequent and distinct remissions of fever and pain. By the itching and desquamation. By the absence of the profuse acid perspiration of acute rheumatism. Sometimes by the age at which it occurs; acute rheumatism being not uncommon in childhood, while gout is very rare before puberty. By the more rapid and complete convalescence. By its being much more common in men than women, while rheumatism is nearly equally common in either sex. By occurring in free livers, and persons of full habit, rheumatism being commonly a disease of debility. Sometimes also by its hereditary transmission, acute rheumatism being rarely an hereditary disease. The metastasis from joint to joint, and the heart affections so common in acute rheumatism, are comparatively rare in gout. By metastasis to the eyes affecting the cornea in gout, and the sclerotic coat in rheumatism. Gout is further distinguished from rheumatism in chronic cases by the *chalk-stones* in the joints of the hands and feet, or in the cartilages of the ear. Also by the detection

of uric acid in excess in the blood, or in the serum of blistered surfaces.

PROGNOSIS.—*Favourable.* Youth, and an unimpaired constitution; a first attack; the more severe the paroxysm, the shorter its duration; the longer the intermission, the more effectual is the paroxysm in removing various anomalous diseases, to which the patient had been subject; its not being hereditary. *Unfavourable.*—Impaired constitution; advanced age; visceral affections; hereditary predisposition; the deposition of chalky matter in the joints: the disease suddenly leaving the extremities, and attacking the stomach, heart, brain, or lungs.

TREATMENT.—*Indications.* I. To shorten the paroxysm, and relieve the sufferings of the patient. II. To prevent the recurrence of the paroxysm.

I. An attack of gout may be effectually shortened by the preparations of colchicum, administered in one of two ways: in a full dose (ʒss to ʒi) of the *Vinum Colchici* at bedtime, followed by a saline aperient in the morning; or, in the smaller dose of ♏xx. three or four times a-day. In either case the colchicum should be combined with laudanum. When administered in a single dose, the following formula will be found convenient: ℞. Vin. colchici, fʒi.; Tinct. opii, ʒss.; Aquæ cinnamoni, Aquæ ää, ʒss. m. f. Haustus, h. s. s. When given in smaller repeated doses the colchicum and opium should be combined with a saline aperient. ℞. Magnesiæ sulph. ʒi.; magnesiæ carb. gr. x.; vin. colchici, ♏xx.; Tr. opii, ♏v. If the medicine occasions diarrhœa, we may substitute the following:—Potassæ bicarbonatis, ℈i.; Liq. ammon. acet. ʒss. Vini colchici, ♏xx.; Tr. opii, ♏v.

The dose of colchicum may be diminished as the inflammation abates, and it may be given in small doses of from five to ten minims, in combination with a gentle saline aperient, for several days, or one or two weeks, after the disappearance of the malady.

The *local* treatment consists in wrapping the inflamed part in flannel, wool, or fleecy hosiery, and keeping the limb as still as possible.

II. The second indication is fulfilled by regular living, avoiding the exciting causes of the disease; by abstinence from fermented liquors, and the moderate use of animal food, and by a milk and vegetable diet; friction with the flesh-brush; regular exercise; Bath waters; the regular use of mild aperients; the continued use of alkaline medicines; and when dyspeptic symptoms are present, the treatment applicable to dyspepsia.

Treatment of retrocedent Gout.—If the stomach is attacked, the liberal administration of stimulants, such as warm brandy and water, wine and aromatics; æther, ammonia, camphor, and musk. Sinapisms should also be applied to the feet, with a view of restoring the external inflammation. Other forms of retrocedent gout must be treated by remedies appropriate to the idiopathic affections of the same organs.

GOUTY CONCRETIONS.—Gouty concretions, chalk-stones, or tophaceous deposits, consist chiefly of urate of soda, and are deposited around the joints, in the bursæ mucosæ, in the ligaments, aponeuroses, and cellular membrane, and even under the cuticle. The pain which they occasion may be relieved by warm poultices, which will also promote separation by suppuration. Great relief is also sometimes experienced from applying rings of blistering plaster above or below the swollen joints. The joints may also be treated with iodine paint.

REMEDIES.—*General.* The Eau Medicinale, and Wilson's Tincture, which contain colchicum or veratria as their active principle. *Local.* A tepid bath of water or of water and muriatic acid (acid one ounce, water a gallon); camphorated spirit largely diluted with water; leeches; blisters; stinging with nettles; burning with moxa; covering the part with oilskin. But the less the part is interfered with the better, for the use of extreme remedies often leads to the translation of the inflammation to an internal organ. A narcotic cataplasm or anodyne fomentation also affords great relief. Cold water, ice, or cold evaporating lotions have been recommended; but cannot be used without danger. For gouty concretions Dr. Alexander Ure (see Med. Chir. Trans., vol. xxiv.) recommends the exhibition of Benzoic acid in doses of a scruple about an hour after each meal. This substance is advantageously combined with some salt of soda, and the best for the purpose is the bicarbonate, which may be given in doses of one, two, or three drachms. This remedy must be persevered in for a considerable period where extensive deposits have already taken place. The iodide of potassium may be given for the same purpose; or, the phosphate of ammonia (ten grains three times a-day. Dr. Edwards).

SPECIAL DISEASES.

CHAPTER I.

DISEASES OF THE NERVOUS SYSTEM.

1. Of the Brain.
2. Of the Spinal Marrow.
3. Of the Nerves of Sensation.
4. Of the Nerves of Motion.
5. General Disorders of the Nervous System.
6. Mental Disorders.

DISEASES OF THE BRAIN.

CEPHALALGIA . . Headache.
ENCEPHALITIS . . Inflammation of the Brain.
MENINGITIS . . Inflammation of the Membranes.
HYDROCEPHALUS . Water in the Head.
APOPLEXIA. . . Apoplexy.
CHRONIC DISEASES OF THE BRAIN.

CEPHALALGIA—HEADACHE.

SYNONYM.—Cephalæa.

Headache is a symptom of almost all acute and chronic diseases of the brain, as well as a distinct functional derangement of very frequent occurrence.

SPECIES.—(*a.*) External, (*b.*) Internal.

(*a.*) External. 1. Cephalalgia muscularis; 2. Cephalalgia periosteosa; 3. Cephalalgia neuralgica.

(*b.*) Internal. 1. Cephalalgia congestiva; 2. Cephalalgia dyspeptica, vel sympathetica. Cephalalgia organica.

EXTERNAL.—1. *Cephalalgia muscularis*, or pain of the muscular covering of the head, affects the occipito-frontalis and temporal muscles. *Diagnosis.*—The pain is diffused over the head, is increased by motion of the eyebrows and jaws, by pressure, and by percussion

with the fingers. It is subject to remissions, and is generally accompanied by pain in the face, neck, shoulders, or other parts of the body. *Cause.*—Exposure to cold. *Treatment.*—That of common cold when recent (see Catarrh), and that of muscular rheumatism when chronic (see Rheumatism). In severe cases, leeches or a blister to the back of the neck.

2. *Cephalalgia periosteosa.*—Seat, the pericranium.—*Diagnosis.* The pain is commonly limited to one spot, and is increased by firm and deep pressure, but is little, if at all, affected by action of the muscles. It sometimes affects the periosteum of the face at the same time, so that the nose is tender to the touch; and it frequently extends to other parts of the body, especially to the shin and sternum. When limited to one spot, it is commonly attended with swelling. *Causes.*—This form of headache is generally traceable to a syphilitic taint, and coexists with similar affections of other bones. In many cases, too, it will be found to have been preceded by ulcerated sore throat, or by syphilitic diseases of the skin. The health also suffers. The appearance and expression of countenance are those familiarly known as *Cachexia syphilitica.*—(See Cachexia, p. 285.) *Treatment.*—That of secondary syphilis. The iodide of potassium in five-grain doses, in infusion of quassia, or other tonic infusion, or with the simple or compound decoction of sarsaparilla, should be given three or four times a-day. If the bone is affected, and matter is formed, free incisions will be required, followed by the treatment prescribed in surgical works for the diseases of bone.

3. *Cephalalgia neuralgica vel periodica.*—Seat, the nerves of the internal angle of the orbit and side of the nose (*megrim*), or of one side of the head and face (*hemicrania*) *Diagnosis.*—Its periodic character distinguishes it from *tic-doloreux.* The pain occurs with regularity at intervals of one day or more. In many cases, however, the disease is not distinctly intermittent, but is characterised by irregular intervals of perfect ease, and by being bounded by the central line of the head and face. The absence of tenderness on pressure, and of increase of pain on contraction of the muscles of the scalp, distinguish this from the first and second forms. *Cause.*—Exposure to cold and wet—marsh miasma. *Treatment.*—The same as for ague, viz., quinine (in doses of two grains), or liq. pot. arsenitis (in doses of five drops, combined with some tonic infusion, three times a-day). The latter remedy, cautiously administered, is to be preferred. The treatment is the same, whether the disease is distinctly intermittent or merely limited in the manner just stated. The general health must at the same time be attended to.

INTERNAL.—1. *Cephalalgia congestiva,* or *congestive headache.* This presents itself in three different states of constitution—the plethoric, the delicate and irritable, and the weak and leucophlegmatic. *Diagnosis.*—Obtuse pain, affecting the whole of the head, especially the forehead and occiput, combined in the *plethoric* with a bloated

countenance, a full red eye, distension of the veins, a full pulse, and a dull and heavy expression of face: in the *delicate and irritable*, with flashes of light, floating specks before the eyes, noises in the ears, cold extremities, and a small, frequent, quick pulse; in *anæmic* subjects, with pale skin, lips, tongue, and gums, cold extremities, beating at the heart, violent throbbing of the carotid arteries, and small, frequent, quick pulse. In the two latter classes of persons, it is brought on in severe paroxyms, by sudden noises, mental emotions, or violent muscular exertion. *Treatment.*—In the *plethoric*, that of plethora (p. 279). In the *delicate and irritable*, by repose of mind, careful attention to the state of the stomach and bowels, and sedative medicines. A pill, combining a sedative with an alterative, may be given every night, or every other night; and a saline aperient, combined with some tonic infusion, every morning, or every other morning. (℞. Pil. hyd. chloridi c. gr. i.; Pil. rhei. c., Ext. conii, āā gr. ii. f. pilula. ℞. Sodæ sulphatis ℥ss.; Sodæ carb. gr. x.; Tinct. zingib. f. ℥ii.; Infus. cascarillæ f. ℥x.) In *anæmic* subjects the treatment of anæmia (p. 280).

2. *Cephalalgia dyspeptica vel sympathetica.—Diagnosis.* Pain usually fixed, in the left temple, over the right eye, or on the forehead. It commonly commences when the patient first rises in the morning, and in slight cases continues till after breakfast; in more severe ones, it begins as a diffuse heavy pain, and gradually becomes fixed in one spot, accompanied with nausea, sickness, and vomiting. There is also confusion of thought, dimness and indistinctness of vision, and singing in the ears. Sometimes the fit is removed by free evacuation of food, or of frothy mucus or bile from the stomach. Its duration varies from some hours to three or four days, and in confirmed cases it returns at short intervals, and is attended with great suffering. Sometimes there is much flatulence, and relief is only afforded by free eructation. *Cause.*—Derangement of the functions of the stomach and bowels. The abuse of aperient medicines, by which the tone of the alimentary canal is weakened. *Treatment.*—Gentle aperients in combination with alkalies, as rhubarb with soda, or magnesia; or the dinner pill. Regulation of the diet; proper exercise; emetics, where the cause is transient. In cases of obstinate sick headache, emetics of ipecacuanha may be administered every morning with the best effect. If large quantities of bile are ejected from the stomach (bilious headache), small doses of calomel, or hyd. c. cretâ (a quarter of a grain of the first, or a grain of the second, administered three times a-day, with two or three grains of extract of poppy), will be found useful. When the bowels are very irritable, and act irregularly, the compound rhubarb pill should be combined with extract of conium, in equal parts. When much flatulence is present, ginger or alum may be combined with the other medicines, or strong mint-water may be made the vehicle of saline aperients. Cold to the head sometimes acts as a palliative. A draught containing from five to ten grains of carbonate of ammonia given at the com-

mencement of the attack will sometimes arrest it. (℞. Ammon. carb. gr. v. vel x. Sodæ carb. gr. x. Infus. Cascarillæ ℥i.).

3. *Cephalalgia organica.—Diagnosis.* Difficult when there is no morbid affection of the senses or moving powers. The pain is fixed and deep seated, is affected by motion and change of posture, by heated rooms, by noise, and by mental application. If accompanied with disordered digestion or with sickness, it is not relieved by vomiting. Sometimes it is intermittent, and in such cases the diagnosis is more difficult still. The nature of the disease is at length made known by some affection of the senses, by paralysis, spasms, or convulsions. *Causes.*—Narcotic and narcotico-acrid poisons. The setting in of febrile diseases. The early stage of phthisis pulmonalis. *Treatment.*—That of the disease of which it is the symptom. The state of the circulation through the brain must be carefully watched, and local and general blood-letting, purgatives, and counter-irritants, must be resorted to; at the same time that strict attention is paid to the state of the general health. In chronic inflammatory affections of the brain, a course of mercury, carried to the extent of affecting the mouth, will sometimes effect a cure.

Great caution is necessary in inquiring into the cause of headache, and in discriminating one form from another; the treatment will entirely depend on the accuracy of the diagnosis. Sometimes, for instance, a patient complaining only of headache, will be found to be suffering from phthisis pulmonalis. (G.)

ENCEPHALITIS—INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

SYNONYMS.—Phrenitis. Meningo-encephalitis.

SPECIES.—1. General, or involving the whole, or a considerable portion, of the substance and membranes of the brain. 2. Partial, or affecting only a part of the substance, or of the substance and membranes, of the brain.

1. GENERAL INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

SYMPTOMS.—This disease does not always commence in the same way. In one class of cases it begins with acute pain in the head and violent delirium; in a second with nausea, bilious vomiting, and obstinate constipation; in a third with a paroxysm of general convulsions; in a fourth, and very rare class, with loss of speech.

The disease, when fully formed, is characterized by excruciating pain in the head; throbbing of the temporal and carotid arteries; flushed face; injected and brilliant eyes; contracted pupil; and a peculiarly wild expression of countenance. There is intolerance of light and sound, constant watchfulness, want of sleep, fierce delirium,

and convulsions. The skin is hot and dry, the pulse hard and frequent, sometimes full, sometimes contracted; the tongue red and dry, or covered with a white fur; there is intense thirst, with nausea and bilious vomiting; and the bowels are obstinately confined. These symptoms, which belong to the stage of *excitement*, continue for a variable period of from one to three days, and, gradually subsiding, are succeeded by low muttering delirium, deafness, indistinctness of vision, insensibility of pupil, strabismus, twitchings of the muscles, tremors, or partial paralysis, relaxation of sphincters, occasional retention of urine, cold sweats, and the facies Hippocratica; or by profound coma.

TERMINATIONS.—When fatal, in coma; or in great postration of strength, with typhoid symptoms. Recovery may be complete, or the disease may leave behind it mania, dementia, or paralysis. The duration varies from twelve or twenty-four hours to two or three weeks, or even more.

CAUSES.—Excessive heats, or great vicissitudes of temperature; exposing the head uncovered to the sun, (*coup de soleil*); violent exercise; excited passions of the mind; intense study; irritating matter in the stomach; external violence; the abuse of spirituous liquors; metastasis of gout, rheumatism, erysipelas, exanthematous fevers, small-pox, measles, and scarlatina; the repression of cutaneous affections, especially those of the scalp; hooping-cough; dentition; the extension of inflammation from the ear. Inflammation of the brain may also supervene on pneumonia, phthisis, renal affections, and all febrile diseases.

DIAGNOSIS.—From *mania*, by the marked febrile symptoms, and by its rapid course. From *febrile delirium*, by the delirium being a primary and not a secondary affection. From *the delirium of typhus*, in the greater number of cases, by its sudden accession and great violence. From *the effects of loss of blood*, by the history of the case, the inflammatory symptoms, and the flushed face. From *delirium tremens*, also, by the history of the case, hot, dry skin, and high fever, and the absence of the tremulous motions of the body and limbs. In most cases of delirium tremens the face is pale, and the skin moist; the limbs tremble, and the patient can be easily roused so as to answer questions.

ANATOMICAL CHARACTERS.—Thickening of the arachnoid, effusion of serum mixed with flakes of lymph, or of coagulable lymph, or of pus, under the arachnoid and into the meshes of the pia matter, or into the ventricles, with softening of their walls; the incised surfaces of the brain present numerous red points, the medullary substance is of a light pink hue, and the cineritious substance of an ashy red, not removed by washing; suppuration, softening, or hardening, of the substance of the brain.

PROGNOSIS.—*Favourable.* The return of sleep and consciousness; a warm and equable perspiration; diarrhœa; a sediment in the urine;

hæmorrhage from the nose; diminished frequency, and greater fulness and softness of the pulse; inflammation attacking a less important part. If preparations of mercury have been given, the occurrence of salivation. *Unfavourable.*—Profound insensibility, tremors, convulsions; involuntary evacuations; suppression of urine; the face from being flushed suddenly becoming pale; paralysis; inflammation of other viscera, without diminishing the symptoms of the original disease; delirium changing to coma.

TREATMENT.—I. *During the period of excitement. Indication.* To diminish the quantity of circulating fluid, and the force of the circulation, in the system in general, and in the head in particular—

(*a.*) By bleeding.—A copious and sudden evacuation of blood from a free orifice in the arm, in the erect or semi-erect position, to be repeated, if necessary, proportioning the quantity to the age, sex, temperament, and habit of the patient. This may be followed up, if necessary, by topical depletion, by cupping or leeches to the temples, or by opening the temporal artery.

(*b.*) By active purging at the outset with castor or croton oil, or with a full dose of calomel and colocynth, followed by the senna draught; the action of the bowels to be kept up, and salivation to be, if possible, induced by five-grain doses of calomel every two, three, or four hours.

(*c.*) By depressants, in doses short of inducing vomiting. Of these the tartar-emetic is the best. It may be given in doses of a sixth to a fourth of a grain, cautiously increased, and at frequent intervals, and may be usefully combined with the calomel.

(*d.*) By counter-irritants to the extremities, such as the mustard-poultice or a large blister to the inside of the thighs, or hot water to the feet frequently renewed.

(*e.*) By strict antiphlogistic diet; no food whatever should be allowed during the inflammatory period, except barley-water, gruel, sago, panada, arrowroot, or the like.

(*f.*) By cold lotions constantly renewed, or ice to the head; or a stream of cold water poured upon the shaved head. This latter is to be preferred to all other means of applying cold, especially when there is violent delirium.

(*g.*) By complete rest and perfect quiet. The sick-room should be darkened, and the most perfect tranquillity should be observed. The head should be raised by pillows.

II. *During the period of torpor or collapse.*—If the patient has not been already bled, or if the pulse remains hard and frequent, general or local abstraction of blood is indicated, proportioned in quantity to the remaining strength of the patient. Purgatives may also be given with the same precaution. Counter-irritation by mustard poultices or blisters to the inside of the thighs, may be used in combination with the other measures, or when the strength of the patient is greatly exhausted, alone.

When the symptoms of excitement have passed away, and insensi-

bility or general torpor remains, a large blister to the scalp will often be attended with great benefit. In extreme collapse, ammonia, wine, and brandy must be given, with beef-tea and nourishing food, and opium or laudanum may be cautiously administered, its effect being narrowly watched. The state of the bladder must be ascertained at every visit, and if retention of urine exist, the water must be drawn off two or three times a-day.

III. *During convalescence.*—The patient must be narrowly watched, the diet must be carefully regulated, the bowels must be kept free by gentle aperients, and the patient should not be allowed to resume his ordinary occupation till his health is quite re-established. On the occasion of any slight relapse, cold applications to the head, counter-irritants, and more active purgatives may be resumed. If the mind does not recover its tone, but the memory is impaired, and the patient remains weak and irritable, the cold douche or the shower-bath every morning, with or without blisters to the scalp, or a seton in the neck or arm, may be resorted to.

When the disease is symptomatic of intestinal irritation in children, or of remote visceral disease in adults, special attention will have to be given to the local complication.

2. PARTIAL INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

SYMPTOMS.—Often very obscure; and varying with the extent, degree, and progress of the inflammation, as well as with the part of the brain attacked.

In most cases, the first symptom is pain in the head, more or less severe, rarely altogether absent, but subject to exacerbations, under the influence of causes affecting the circulation. This symptom is accompanied from the first, or followed after a time, by giddiness, singing in the ears, indistinct or disordered vision, numbness or increased sensibility of the fingers, of the hands and arms, or of other parts of the surface of the body; and slight convulsive movements of the limbs, with occasional attacks of nausea and faintness. The patient is restless and irritable, or suffers from extreme depression of spirits; the sleep is disturbed, and the mind generally more or less impaired. The state of the circulation is very variable, the pulse being at one time slow and regular, and the countenance pale; at another time, the pulse being frequent and the face flushed; these two opposite states often alternating with each other at short intervals. In some cases the symptoms are distinctly remittent, or even intermittent. The functions of the stomach are generally impaired. The patient suffers from nausea and anorexia, and is liable to frequent attacks of vomiting. As the disease advances these symptoms become more strongly marked, and rigid contractions of particular muscles or groups of muscles are superadded to them, occasioning squinting, distortion of the features, difficult and indistinct pronunciation of particular letters or words, and sometimes great difficulty in swallowing. When the muscles of the extremities are the seat of this

rigid contraction, the limbs assume a flexed position, from which any attempt to move them occasions great pain. The pupils of the eye are generally less sensitive than usual, dilated, or of unequal sizes, and the sight of one or both eyes is found to be impaired. In a still more advanced stage of the disease, the partial contractions of the limbs are exchanged for very extensive and constantly-increasing loss of power and sensation, all the senses fail, the sphincters are relaxed, and the patient sinks utterly helpless and exhausted.

The duration of this disease is extremely variable. It may assume from the first an acute character, and terminate fatally in a few days; or it may run a chronic course of several weeks, months, or years, or the chronic form may, at any time, be exchanged for an acute attack, with extensive inflammation of the membranes of the brain.

ANATOMICAL CHARACTERS.—Congestion of the affected portion of the cerebral substance; hardening of its texture; white or red softening; small extravasated spots of blood; abscess or infiltration of pus; encysted abscess; fatty degeneration of the vessels; gangrene; inflammatory appearances in the membrane covering the inflamed substance. The presence, in one of the vessels, of particles of fibrin or of earthy matter detached from the valves of the heart.

CAUSES.—Those of encephalitis.

DIAGNOSIS.—Headache followed by rigidity of some part of the body, and that by paralysis, affords a strong probability of congestion or inflammation of a portion of the substance of the brain, going on to softening. If the affection of the face and extremities is confined to one side of the body, the opposite side of the brain may be presumed to be the seat of the affection; if it extends to both sides of the body, the disease may be supposed to be on both sides, or near to the central line on one side. If the patient suffers from constant pain in the back of the head, and from troublesome erections, and the purely intellectual faculties are little implicated, there is a probability in favour of the cerebellum being the seat of the disease.

PROGNOSIS.—Unfavourable in every stage of the disease, but especially when rigid contractions or paralysis have set in. Somewhat more favourable when the disease is the direct consequence of a wound or external injury.

TREATMENT.—That of encephalitis; but less active. Depletion when indicated should be practised with great caution, and rather by cupping and leeches to the temples or back of the neck, than by the lancet. Counter-irritants may also be prescribed with advantage, of which the best is a seton or issue in the inside of the arm. The rest of the treatment will consist in the daily use of gentle saline aperients, so as to keep up a constant free action of the bowels, a spare diet, and rest of mind and body.

In the early stage of the disease, mercury may be given so as slightly to affect the gums, with some prospect of advantage.

MENINGITIS—INFLAMMATION OF THE MEMBRANES OF THE BRAIN.

SYNONYM.—Arachnitis.

Under this head are comprised inflammation of the arachnoid and pia mater, usually designated *meningitis;* inflammation of the arachnoid alone, called *arachnitis,* and inflammation of the dura mater. Cases of pure arachnitis are of such extremely rare occurrence, and their symptoms differ so little, if at all, from those of mixed inflammation of the arachnoid and pia mater, that a separate description of the symptoms of arachnitis is alike difficult and unnecessary. Meningitis, or inflammation of the arachnoid and pia mater, and inflammation of the dura mater, are the only diseases which it is proposed to describe under the general title of meningitis.

INFLAMMATION OF THE ARACHNOID AND PIA MATER.

SYMPTOMS.—This diseases commences differently in different cases. Sometimes it begins with sudden and violent pain in the head, with loud screaming, which is followed by convulsions. In other instances it also commences suddenly with a long-continued paroxysm of general convulsions. In a third class of cases its attack is less sudden, the convulsions being preceded for two or three days by a general feeling of discomfort, slight headache, nausea, and vomiting. The pulse is generally quickened, but sometimes natural in frequency, sometimes less frequent than in health. When the disease is fully formed, the leading symptoms are acute pain, often expressed by sharp-piercing cries, and increased by motion, intolerance of light and sound, grinding of the teeth, sleeplessness, furious delirium, a flushed face and suffused eye. Twitchings and convulsions are commonly present, and sometimes strabismus; vomiting is a common symptom, and the bowels are obstinately confined; and the disease, when fatal, generally terminates in coma.

For the treatment, see Encephalitis.

INFLAMMATION OF THE DURA MATER.

SYMPTOMS.—Pain in the head, fever, and rigors, which often recur at regular intervals, and simulate ague. The intellectual faculties are, at first, but little affected, but during the progress of the disease the patient often falls into a state of coma. If the inflammation extends to the other membranes, or to the substance of the brain, the symptoms proper to inflammation of those parts show themselves. This disease is rarely idiopathic, but follows on injuries to the scalp or skull, or on inflammation of the ear.

For the treatment, see Encephalitis.

HYDROCEPHALUS—WATER IN THE HEAD.

VARIETIES.—1. Acute; 2. Chronic.

1. ACUTE HYDROCEPHALUS.

SYMPTOMS.—This disease, like inflammation of the brain and its membranes in the adult, begins differently in different cases. Sometimes it is preceded, for a considerable period, by languor, inactivity, loss of appetite, nausea, vomiting, parched tongue, hot dry skin, flushing of the face, and other symptoms of pyrexia, or by the symptoms of infantile fever. (See Infantile Fever, p. 359.) In a second class of cases, it begins suddenly with the symptoms of inflammation of the brain and its membranes in the adult. (See Encephalitis, p. 394.) In a third class of cases, again, it comes on, slowly and obscurely, in the course of febrile disorders or of the exanthemata.

The disease itself is characterised by acute darting pains in the head, with heat of scalp; great sensibility to light, suffused redness of the eyes, flushed countenance, and hot and dry skin. The pupils are contracted and the brows knit. The patient is very restless, moans incessantly, tosses about, and rolls the head from side to side. The sleep is short and disturbed, and the patient often wakes screaming. The gait is tottering, and the hand is often raised to the head. The pulse is much increased in frequency, hard, and quick; the respiration is hurried, and interrupted by frequent sighs. The tongue is coated; there is nausea or vomiting: the bowels are either obstinately confined, or unusually loose, with fœtid evacuations; and the urine is scanty, high-coloured, and turbid. Delirium and convulsions are sometimes combined with these symptoms of the stage of *excitement*. In infants there is strong pulsation of the fontanelles.

After a variable, and often a considerable period, the violence of the symptoms begins to subside, the pain becomes less acute, the patient keeps up a low moaning; an uneasy sleepiness succeeds a constant state of watching; the pupils are dilated, and strabismus is often present; the pulse is now preternaturally slow and often intermitting, but subject to great and sudden increase of frequency on change of posture; and the respiration is more frequently interrupted by deep sighs. The strabismus increases; the pupils become more dilated and cease to contract on being exposed to light; and double vision or complete loss of sight, with lethargic torpor, succeed.

After a shorter or longer continuance of the second stage, the pulse resumes its quickness, and becomes so extremely small and rapid as scarcely to be numbered: the respiration is difficult or stertorous: the limbs are convulsed or paralysed; the skin is covered with a cold sweat; the evacuations become involuntary; maculæ sometimes appear about the joints, and in different parts of the body; and at length the patient expires in dreadful convulsions, comatose, or exhausted.

TERMINATIONS.—In slow recovery; in death; or in chronic hydrocephalus.

ANATOMICAL CHARACTERS.—Serum, limpid or turbid, to the amount of several ounces, in the ventricles of the brain; softening of the surrounding cerebral substance; flattening of the convolutions; serous effusion beneath the membranes of the brain; the cortical texture of the brain of a pink hue, the medullary matter, when sliced, exhibiting great numbers of red points. The pia mater unusually vascular; the arachnoid presenting an opaque appearance; minute semi-transparent or opaque bodies, single or in patches, in the substance of the pia mater; sometimes larger masses of tuberculous matter from the size of a millet-seed to that of a pea, constituting *tubercular meningitis.*

CAUSES.—*Predisposing.* Infancy and childhood; debility; scrofulous diathesis.—*Exciting.* Intestinal irritation; dentition; metastasis of eruptions on the scalp or body; extension of inflammation from the ear; febrile and exanthematous disorders; premature application to study.—*Proximate.* In the greater number of instances tubercular deposits in the pia mater, giving rise to inflammation of the membranes.

DIAGNOSIS.—The most prominent symptoms are, the excruciating pain in the head, flushed face, restlessness, and fever; followed by strabismus, dilated pupil, and profound stupor; the pulse at first preternaturally quick, afterwards becoming inordinately slow or intermitting, and then, again, increasing in frequency. It is necessary to distinguish this disease from one of an opposite character, called *spurious hydrocephalus*, which has the following characters: *a pale cheek, a cool or cold skin*, an expression of great languor, and *an absence of febrile symptoms*, or, at the most, an occasional and transient flushing of the face; to which may be added, in the case of infants, a sunken, instead of swollen fontanelle. On inquiry, the child will be found to have suffered from loss of blood, from long-continued diarrhœa, or from some other exhausting discharge.

PROGNOSIS.—Very unfavourable; especially where the coma is great, with total loss of sight, weak intermitting pulse, great enlargement of the head, apoplectic stertor, difficult respiration, and involuntary evacuations.

TREATMENT.—*Indications.* I. To subdue inflammation. II. To remove existing sources of irritation.

I. The inflammation is subdued by—

(*a.*) Abstraction of blood by venæsection, or by the application of leeches to the temples or back of the ears, or by opening the temporal artery. In very young children, leeches to the temples or behind the ear will answer every purpose of venæsection or arteriotomy.

(*b.*) Cathartics; of submuriate of mercury, with jalap or scammony. Half a drop, or a drop, of croton oil is a sure purge, which may be disguised and given to children when other medicines are refused.

(*c.*) Antimonial preparations. These may be given in combination

with preparations of mercury. Calomel, in doses of two or three grains, every two or three hours, either alone or in combination with tartar-emetic, in doses of one-eighth to one-sixth of a grain or more, is perhaps the best remedy. Children bear purgatives, and especially mercurial purgatives, well.

(*d.*) Cold applications to the head; by cloths wetted with cold water, vinegar and water, iced water, or the spirit lotion. Cold water dropped on the head, the head being slightly raised, and the effect of the cold to the head being increased by immersing the lower extremities, or the body of the patient, in warm water.

(*e.*) Counter-irritants, in the shape of mustard poultices or blisters to the thighs, chest, or back of the neck.

II. The second indication is fulfilled by the use of aperients and alteratives to free the alimentary canal and correct the secretions, and by the free use of the gum lancet, if the teeth are the source of irritation.

2. CHRONIC HYDROCEPHALUS.

SYMPTOMS.—Children are sometimes born with this disease. In other cases it comes on slowly and insidiously; or it follows the acute form. It takes place at all periods between birth and the age of eight, very seldom after, and is known by drowsiness, languor, strabismus, vomiting, costiveness, coma, and convulsions; the bones of the head separate, the fontanelles enlarge, and the head acquires an immense size. The patient may survive, in spite of immense enlargement of the head, for months or even years.

CAUSES.—*Predisposing.* Infancy; the scrofulous diathesis.—*Exciting.* Injury to the brain during labour; tumours within the cranium; the causes of other dropsies; dentition; irritation in the intestinal canal. It is also a consequence of the acute form.

DIAGNOSIS.—The history of the case, the large size of the head, and the prominence of the fontanelles.

PROGNOSIS.—The disease generally ends fatally; though after the bones begin to separate, its fatal termination is protracted. Death is commonly preceded by convulsions.

Parents often express anxiety about the large size of their children's heads, and they are sometimes told that the enlargement is due to water in the head. As this question is often put to the medical man, it is well that he should be cautioned not to attribute a large head to this cause, unless the increased size is accompanied by other decided symptoms of the disease.

TREATMENT.—*Indications.* I. To promote the absorption of the effused fluid. II. To improve the general health.

I. The first indication is fulfilled by—

(*a.*) Counter-irritants; blisters to the head, kept open for days or weeks by the unguentum lyttæ or the unguentum sabinæ; or frictions with tartar-emetic ointment; or an issue over the fontanelles.

(*b.*) Mercury; applied externally, and given internally, so as to affect the mouth.

(*c.*) Diuretics of squills, digitalis, and submuriate of mercury, as recommended for anasarca.

II. The second indication is fulfilled—

(*a.*) By a careful regulation of the diet according to the age of the child. A light nutritious diet, composed of sago, arrowroot, tapioca, and light puddings should be prescribed; and if there is much prostration of strength a teaspoonful of some of the white wines, sherry, or Madeira, may be given at short intervals throughout the day. In protracted cases, successive tappings of the brain for the removal of the fluid, followed by compression, have been practised with complete success; and compression, alone, has proved successful in one or two cases. In *spurious hydrocephalus*, brought on by exhaustion, a nourishing diet, with a due allowance of wine, warm temperature, vigilant nursing, and the preparations of steel (of which the vinum ferri is the best), in doses proportioned to the age.

(*b.*) By tonics, such as quinine, and the preparations of iron.

(*c.*) By a change of air, especially if the patient inhabits a low and damp situation, to the sea-side, or a dry and bracing inland spot.

APOPLEXIA—APOPLEXY.

Species.—1. Simple or congestive apoplexy; *i. e.*, congestion of the vessels of the brain without rupture; 2. Hæmorrhagic apoplexy, or congestion with rupture; and, 3. Serous apoplexy, or congestion with serous effusion.

Symptoms.—This disease makes its attack in one of three ways:—1. Suddenly, the patient falling down without warning, as if from a blow. 2. After a short premonitory stage, consisting of acute headache, sickness, and faintness. 3. With sudden hemiplegia.

In the first form of the disease, the patient falls to the ground, foaming at the mouth, his countenance livid, his pupils dilated, and the mouth slightly drawn to one side. The urine and fæces are discharged involuntarily, the extremities are cold and livid, the skin bathed in a cold sweat, and death takes place in a few minutes, sometimes with, and sometimes without, stertor.

In whatever way it may commence, the fit is characterised by complete insensibility, accompanied by slow and noisy, or stertorous and puffing breathing; difficult deglutition; flushed and livid countenance; prominent and motionless eye, with (generally) a contracted pupil; the limbs are either motionless or rigid, or convulsed; or these several states exist only on one side, or in one limb. The bowels are either obstinately confined, or the evacuations are passed involuntarily; the urine also is either passed involuntarily, or, being retained till the

bladder is full, dribbles away. The pulse is full, strong, and quick; but sometimes more and sometimes less frequent than natural.

In some cases of apoplexy the patient does not lose his senses entirely, but, the organs of speech being paralyzed, he expresses himself by signs.

Apoplexy is sometimes preceded for a considerable period by premonitory symptoms, such as giddiness, headache, a sense of pressure and constriction in the head, confusion of ideas, incoherence, loss of memory, faltering speech, flushing of the face, hæmorrhage from the nose, flashes of light, noises in the ear, visual spectra, double vision, transient blindness or deafness, drowsiness, numbness of the extremities, pallor, nausea, vomiting, and faintness.

TERMINATIONS.—Suddenly in death. In death, after a variable interval. In complete recovery, which is commonly preceded by vomiting and profuse perspiration. In partial recovery, with more or less impairment of mind, and more or less extensive paralysis.

ANATOMICAL CHARACTERS.—In *congestive* or *simple* apoplexy, distension of the vessels of the brain, with or without effusion into the ventricles, or at the base. In *hæmorrhagic apoplexy*, effusion of blood in the substance of the brain, into the ventricles, at the base, or on the surface: in *serous* apoplexy, effusion of serum in the ventricles, or under the arachnoid, on the surface, or at the base of the brain.

CAUSES.—*Predisposing.* A certain age: from the fiftieth to the eightieth year: the liability increases as age advances. Few cases occur under twenty, and very few indeed in infancy and childhood. A certain make of body, combining a short thick neck, large chest, florid complexion, and stout person; but the disease often occurs in persons of the very opposite conformation. Hereditary tendency; indulgence in the luxuries of the table; suppression of usual evacuations; intense study; sedentary life; plethora, however induced; hypertrophy of the left ventricle of the heart; diseases of the valves of the heart; metastasis of gout or rheumatism; and repression or non-appearance of exanthematous eruptions, as variola, rubeola, or scarlatina.

Exciting.—Violent exercise: strong expiratory efforts, as in singing and playing on wind instruments: suddenly rising from the stooping posture: straining at stool, &c.; sudden emotions and violent passions of the mind; exposure to intense cold or heat; sudden or long stooping; pressure on the neck; venereal excesses; overloading the stomach; certain narcotic substances, such as opium, alcohol, and the narcotic gases.

DIAGNOSIS.—From the effect of spirituous liquors, by the odour of the breath. From the effect of narcotic poisons, by the history of the case.

PROGNOSIS.—*Favourable.* Youth. The senses little impaired; the function of respiration not much affected; hæmorrhage from the nose or hæmorrhoidal vessels; diarrhœa; profuse perspiration; a

sudden attack, if not immediately fatal, as compared with an attack preceded by premonitory symptoms of long continuance.

Unfavourable.—Protracted beyond the third day; increased frequency of pulse from the first, or after an interval. Any of the characteristic symptoms in a very marked form; involuntary evacuations; retention of urine; cold extremities; cold and clammy sweats.

TREATMENT.—During or immediately after the fit. The first thing to be done, in all cases, is to loosen the patient's neckerchief and shirt-collar, raise his head, or place him, if convenient, in a chair, and open the window of the apartment. If the face is turgid and the eye injected, or if the face being pale, the pulse is full, hard, and jerking, we open a vein, and allow the blood to flow till the approach of syncope, taking care that the patient does not faint. If, on the other hand, the face is pale, and the pulse feeble and intermittent, the patient must be treated as if he were in a fainting fit, and the bleeding must be postponed till decided reaction has occurred, and the symptoms just stated have shown themselves.

In the after-treatment, the *indication* is to reduce the action of the heart, and diminish the force of the circulation through the brain.

1. By bleeding from the arm at intervals, from a small orifice, in the semi-erect position, and with constant reference to the effect produced upon the pulse and aspect of the patient, whenever and so long as there are evidences of fulness of blood, or excitement of the circulation. The paleness of the countenance must not prevent us from bleeding when the pulse is strong; nor the weakness of the pulse, when the face is turgid and the eyes injected.

2. The application of leeches and cupping-glasses.

3. Drastic purgatives, of which croton oil, in doses of one or two drops, is the most easily used and most efficacious. Purgative enemata.

4. Cold to the head, if the surface is hot.

5. Counter-irritants to the back of the neck, sternum, or legs, and, after a time, to the scalp.

6. A strict diet, consisting at first of simple farinaceous food, for which a more generous diet must be cautiously and gradually substituted.

7. If the disease take place soon after a full meal, an emetic must be employed; or an attempt must be made to evacuate the stomach by tickling the fauces with a feather.

When apoplexy arises from suppression of the menstrual or hæmorrhoidal flux, we should apply leeches to the vulva, or about the anus. When there is profound coma or collapse, we should apply irritating liniments to the legs, thighs, and neck; and if these fail, and life is nearly extinct, we should pour boiling water over the extremities, or apply nitric acid to the nucha: the hot-air bath, or stimulants, in such cases, have produced reaction; and when this happens, depletion may be necessary.

When apoplexy supervenes after a retrocession of gout or of acute

rheumatism, we should irritate the affected joint by sinapisms, blisters, hot turpentine, or antimonial ointment: depletion in such cases is generally injurious.

If the patient cannot swallow, great care is required lest anything get into the glottis, and cause suffocation, and when this is likely to happen, all attempts to administer nourishment in this way should be abandoned, and mechanical means resorted to.

In this disease, as in the last stage of typhus, we must examine the hypogastrium daily, and draw off the urine, if necessary.

When convalescence commences, we should regulate the bowels, insert an issue or seton in the neck, in the middle of the arm, or on the external surface of the knee. When paralysis ceases in one limb, and seizes another, we must resort to general and local bleeding, counter-irritation, purgatives, &c., provided the general symptoms justify the use of active measures.

In the treatment of apoplexy, in all its stages, it is important not to carry depleting measures to an extreme. An undue activity in this respect has doubtless led to fatal consequences. Severe antiphlogistic measures are also decidedly contraindicated in aged and feeble persons, in whom it will suffice to keep the bowels somewhat more open than usual, and to regulate the diet, avoiding, or prescribing, wine and other stimulants, according to the state of the system.

PROPHYLAXIS.—As apoplexy depends on a determination of blood to the head, and generally on a plethoric habit, persons predisposed to the disease should abstain from ardent or fermented liquors, observe great moderation in the use of animal food, and carefully avoid all food difficult of digestion, or found to disagree. In extreme cases, a vegetable or a milk diet must be insisted on; and on the recurrence of symptoms threatening apoplexy, a greater strictness of diet, and a more open state of the bowels; and if these do not remove the symptoms, dry cupping to the neck, or the abstraction of blood, by cupping from that part, must be resorted to. Hot rooms and late suppers must be avoided. The patient should take regular exercise in the open air, and keep the bowels free; and he should wear nothing tight about the neck or waist.

For the treatment of paralysis following apoplexy, see Paralysis.

CHRONIC DISEASES OF THE BRAIN.

There are several chronic diseases of the brain, such as softening, induration, hypertrophy, atrophy, abscess, and scrofulous, cancerous, and other tumours. The symptoms and diagnosis of these diseases are extremely obscure and uncertain, and the same symptoms may be present in very different states of the organ.

It would, therefore, answer no good purpose to enter into a minute description of them. The presence of convulsions, and of rigidity or paralysis of the limbs, would indicate disease of the brain or spinal

cord; similar affections of the muscles of the face (with the exception of paralysis of the facial nerve, which is often due to a local affection of this nerve itself), paralysis of the muscles of the tongue, affections of the organs of sense, and impairment of the several faculties of the mind, would indicate disease of the brain. The nature of the disease may also sometimes be inferred from the history of the case. Thus, the presence of tubercles in the lungs, or in the peritoneum, would lead to the inference that any existing disease of the brain might be of a scrofulous nature; and so of other malignant degenerations. Individual symptoms, too, furnish a probability of particular diseased conditions. Thus, rigid contractions of the limbs, or general and long-continued convulsions, afford a probability of inflammatory softening of the brain: extensive paralysis, of a more chronic form of the same disease. The treatment of all such cases must be guided by existing symptoms, and the state of the constitution.

In many cases, chronic diseases of the brain are unattended with any symptoms which could lead us to suspect their existence. Thus, we have it on the authority of Louis, that out of twenty cases of fungus of the dura mater, three only had cerebral symptoms of any kind: and chronic abscesses, hydatids, cysts, exostoses, &c., sometimes attain uncommon size, without any attendant symptoms of cerebral disorder.

DISEASES OF THE SPINAL CORD AND ITS MEMBRANES.

MYELITIS . . . . . Inflammation of the Spinal Cord.
SPINAL MENINGITIS . . Inflammation of the Membranes of the Cord.
OTHER DISEASES OF THE SPINAL CORD.

MYELITIS—INFLAMMATION OF THE SUBSTANCE OF THE CORD.

SYMPTOMS.—Dull aching pain in the part affected, with some tenderness on pressure; loss of sensation and voluntary motion; or numbness and impaired sensibility, with feebleness of the upper or lower extremities, or of both, or of a single limb; or loss of sensation in one extremity, and of voluntary motion in another. The palsied limbs waste from inaction; but the reflex function remains intact. The muscles of the affected limb may be relaxed, contracted, or convulsed. There is no derangement of the intellectual faculties, unless when the inflammation extends to the brain. Sooner or later, in the course of the disease, retention or incontinence of urine comes on, the motions pass involuntarily, and bed-sores are formed on the back and hips. At last the patient sinks exhausted, or dies comatose from the extension of the disease to the brain. The symptoms vary with the seat of the disease.

2. SUBACUTE SPINAL MENINGITIS—SPINAL IRRITATION.

SYMPTOMS.—Pain in the affected portion of the spine, increased by firm pressure, percussion, or heat. Pain in the left side, under the false ribs, or in all the muscles of the chest, or muscular pain of the most acute kind over the whole of the abdomen. Shortness of breath, and palpitation of the heart. Hysteria, nervousness, depression of spirits, irritable temper, disordered bowels, constipation, flatulence, and deficient, excessive, or depraved menstruation.

Sometimes these disorders, which are often of long continuance, are aggravated after marriage, but especially during lactation and pregnancy; the sufferer is constantly complaining of pains or unpleasant sensations of all parts below the affected vertebræ.

On making firm pressure with the index and middle finger of the right hand on the vertebræ from the neck to the lumbar region, or striking the several vertebræ successively, we discover one or more painful points. On striking the vertebræ, the pains in the side, chest, or abdomen, are immediately increased; or darting pains in those parts are produced, if they did not previously exist. In some instances these superficial pains are accompanied by convulsive movements of the muscles of the trunk.

CAUSES.—*Predisposing.* The female sex. It is common in young females, and is sometimes associated with distortions of the spine.—*Exciting.* Sedentary pursuits, tight lacing, want of active exercise, constipation, painful menstruation, leucorrhœa; the original cause and the effect continuing to react upon and increase each other. Spinal irritation may exist in other diseases, as in spasmodic asthma and chorea. When the symptoms associated with spinal irritation are more severe than those now described, the disease belongs more properly to acute meningitis.

RATIONALE.—The tender state of the spine is the middle link between some remote irritation of the uterus or intestinal canal, and the pains in the muscles of the chest or abdomen. The irritation travels through the nerves of the part affected to the spine, where it first becomes sensible, and thence is reflected as pain to the muscles of the chest or abdomen. The connection of the muscular pain with the tender spine is evidenced by the effect of percussion of the spine in producing or increasing it; and where convulsions are combined with the pain, those convulsions are also produced by striking the spine. In the more severe cases of spinal irritation, which closely border on acute spinal meningitis, pressure on the spine causes both acute pain and violent convulsive or tetanic movements, and the slightest pressure on the site of the reflected pain will also cause convulsions. Pressure or percussion upon other parts of the skin, or on the spine above or below the affected portion of the spinal cord, are unattended either by pain or convulsions. (G.)

DIAGNOSIS.—From general cutaneous tenderness, by the absence of

pain on pressing the base or spine of the scapula, or other projecting portion of bone.

PROGNOSIS.—*Favourable.* The disease is generally amenable to treatment. If neglected, it may pass into the acute form, and so prove fatal.

TREATMENT.—*Indications.* I. To subdue the tenderness of the spine. II. To remove the cause of it. III. To remove the muscular pain.

I. The first indication is fulfilled by the application of leeches or cupping-glasses to the tender part of the back, followed by blisters or the antimonial ointment; and in less severe cases, by the antimonial ointment alone. (The best proportion for the ointment is a drachm of tartar-emetic to an ounce of lard. In cases of extreme tenderness, a drachm of the pulvis opii may be added to the ointment.)

II. The second indication requires aperients and alteratives, and remedies adapted to the particular disorder of the bowels or uterus.

III. The third indication is fulfilled by hot fomentations, or by the emplastrum saponis c. opio, or the emplastrum belladonnæ, applied to the part affected.

In most cases of simple spinal irritation, without deformity, a cure is effected by counter-irritation, with or without local depletion, a course of aperient medicines, and attention to the general health.

3. RHEUMATIC SPINAL MENINGITIS.

SYMPTOMS.—Diffused pain, often very acute, and accompanied by tenderness in the neighbourhood of the spine; with severe neuralgic pain extending the whole length of one arm or leg, according as the disease attacks the lower cervical and upper dorsal vertebræ, or those of the loins. After a time the pain and tenderness become limited to a single spot near the spine, on one side, which is found on examination red and tender, and, after a while, may become the seat of an herpetic rash. The pain in the extremity continues, and is attended with numbness and tingling of the fingers, with loss of power, or complete paralysis.

RATIONALE.—A rheumatic affection of the fibrous tissues of the spinal sheath, and of the tendons of the neighbouring muscles; with cutaneous inflammation of limited extent.

CAUSES.—*Predisposing.* Those of rheumatism and gout.—*Exciting.* Exposure to cold and wet. Fatigue. Constrained posture.

DIAGNOSIS.—From muscular rheumatism by the local pain, and tenderness, and loss of power in the limb.

PROGNOSIS.—Favourable, but guarded.

TREATMENT.—Leeches to the tender spot, followed by warm fomentations; and colchicum (Vin. colch. ℥xx.) with opium (Tinct. opii, ℥v. vel x.) in a saline aperient three times a-day. The recumbent posture, or efficient support for the back.

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OTHER DISEASES OF THE SPINAL CORD.

Serous effusions occur within the spinal canal, as well as in the skull, and may be situate external to the dura mater, or within it, or beneath the arachnoid membrane.

Extravasation of blood may occupy the same situations. It may be induced by falls, blows, slips, or other injuries to the spine, or by violent efforts, as pulling on boots, drawing a cork, or raising a heavy load. Effusions of blood (spinal apoplexy) have also been found in cases in which no accident had occurred; the symptoms being pain in the back, spasmodic contractions of the muscles, paralysis of the bladder, rectum, and lower extremities, convulsions, or coma, and death.

The membranes of the spinal cord may be thickened and indurated, like those of the brain, and from the same causes; and fungous growths form on the dura mater, causing pressure and paralysis.

The substance of the spinal cord may also become firmer than natural, after congestion or inflammation. It is subject, in common with the brain, to atrophy and hypertrophy, to tuberculous deposits, and carcinomatous degeneration, to hydatids and to aneurismal and other tumours.

The diagnosis of all these organic affections is very difficult and uncertain, the prognosis unfavourable, and the treatment chiefly palliative. When accompanied by decided marks of inflammation of the substance of the cord, the treatment is that of Myelitis.

The spinal marrow is also liable, like the brain, to concussion and compression, induced by external injuries, whether inflicted on the back or by falls on other parts of the body. The treatment is similar to that employed in the same diseases of the brain.

A congenital malformation, known as *Hydrorachis*, or *Spina Bifida*, sometimes comes under the notice of the physician. It consists in one or more tumours on the lumbar, dorsal, or cervical vertebræ, which communicate with the medulla spinalis. The tumour varies in size, is often transparent, and the colour of the skin may be natural, reddish, or livid. If pressure be made on the tumour, it induces signs of compression of the brain. The limbs are imperfectly developed, and the rectum and bladder are often paralysed. The skin may be absent, and in this case the tumour is covered by the dura mater, pia mater, and arachnoid membrane; and the pia mater is congested and red. In some cases, the lateral arches of the corresponding vertebræ are separated or wanting. In other cases, there is a division of the medulla, or it is entirely absent where the tumour is situated. The cavity of the arachnoid contains a serous, transparent, sanguinolent or purulent fluid. This fluid may communicate with the brain; or be merely enclosed in the pia mater.

Attempts have been made to treat these tumours by pressure, or by pressure with repeated tappings with a fine needle; but experience has proved that both plans are ineffectual. The tumours, when the integuments are wanting, or very thin, should be protected by a shield.

DISORDERS OF THE NERVES OF SENSATION.

NEURALGIA	Nervous pain.
NEURALGIA FACIEI . . .	Tic Doloreux.
HEMICRANIA	(See Cephalalgia, p. 391.)
SCIATICA	Pain in the hip.
ANÆSTHESIA	Loss of sensation.
ANÆSTHESIA FACIEI . .	Numbness of the face.

NEURALGIA—NERVOUS PAIN.

Pain is not only a symptom of almost all acute, and many chronic, diseases, but also a distinct affection of the nerves themselves. To this latter the term neuralgia is applied. It may have its seat in any of the nerves of common sensation, and in some instances affects those of organic life.

Neuralgia may arise from many causes: sometimes no cause can be discovered either during life or after death; in which case the disease is attributed to a change in the condition of the nerve itself. In other instances it is the consequence of a debilitated state of system, and follows prolonged lactation, long-continued and excessive discharges, or exhaustion from loss of blood. It also occurs in anæmia. In another class of cases it is confined to one side of the head and face, and assumes an intermittent character, and may often be traced to the same cause as ague. In many instances, pain is due to some remote irritation, and is termed sympathetic. Examples of sympathetic neuralgia are the pain in the shoulder, so common in affections of the liver, and pains in the upper arm in certain cases of diseased heart. Here there is a well-known connection between the nerves supplying the diseased organ and those going to the seat of pain. In other instances of sympathetic neuralgia no such connection exists. Thus, common tic doloreux has been distinctly traced to acidity of the stomach, to an overloaded state of the intestines, or to diseased kidney. Another class of cases may be traced to pressure or irritation at the root of the nerves supplying the seat of pain. A spicula of bone, or a fragment of a foreign body, irritating the nervous trunk, is a common cause of severe and inveterate forms of neuralgia. Examples of the same form of disease are, pain in the glans penis from stone in the bladder, pain of the thigh and testicle from irritation of the kidney, pain in the back of the thigh and leg from constipation, and pain at the verge of the anus from the same cause. Distension of the hollow viscera by gas, as in colica pictonum, and in severe flatulence, are other examples of neuralgia from pressure. Another interesting and important class of pains are *reflected* pains, generally situated in the parietes of the chest or abdomen, and very frequently in the left side. They are treated of under the head of Spinal Irritation (p. 410). Pains of the internal viscera, without symptoms of inflammation, form another class of neuralgic affections. Gastrodynia, enterodynia, and hysteralgia, are

examples of pain in the organic nerves of the stomach, intestines, and uterus. Inflammation of the neurilemma is another cause of neuralgia, and combines heightened sensibility with pressure.

NEURALGIA FACIEI—TIC DOLOREUX.

SYMPTOMS.—The disease generally occurs in middle-aged adults, and affects both sexes, consisting in most acute pain coming on at variable intervals, suffering considerable abatement, or entirely disappearing without assignable cause for days, weeks, months, or even years together. The pain is at first confined to a limited spot, its most frequent seat being the right infra-orbital nerve. It is of the acute lancinating kind, compared to electric shocks, or it is a severe burning sensation. Sometimes the pain is the only symptom, but more generally there is some determination of blood to the affected part, with an increase of secretion. If the eye is affected, there is a large secretion of tears; if the mouth or jaw, a copious flow of saliva. After it has continued some time, it is apt to involve other branches of the nerve first affected. Thus, if it begin beneath the orbit, it spreads to the upper lip, and thence to the upper and lower jaw; and it may mount over the orbit, extend over the entire scalp, and even for some distance down the spine. The general health is very little affected; the patient, in spite of the most intense suffering, recovers his flesh and healthy aspect in a few days of intermission, and often attains a very advanced age.

CAUSES.—*Predisposing.* The nervous temperament. The anæmic state. Delicate health.—*Exciting.* Irritation of the root of the nerve within the cranium. Remote organic disease, especially disease of the kidney.

DIAGNOSIS.—From *hemicrania*, by the pain not being intermittent; and, in general, by its more limited extent. From *brow ague*, by the seat of the pain, which is generally beneath the eye.

PROGNOSIS.—Generally *unfavourable*, but more so when it is of long standing, and the general health unimpaired. Functional disease, or a state of health admitting of improvement by medical treatment, is ground for a *more favourable* prognosis. The disease is rarely fatal, and sometimes disappears in old age.

TREATMENT.—This must vary with the cause. If there be pressure, it must, if possible, be removed; if irritation at the root of the nerve, depletion and counter-irritants near the seat of the disease; if inflammation of the nerve itself, more active measures of depletion; if debility, tonics or stimulants according to the degree of it; if anæmia, steel; if indigestion or constipation, medicines appropriate to those disorders; but if the health be good, care should be taken not to impair

it, for debility always increases the suffering. Increased determination of blood to the seat of the pain has the same effect; if, therefore, the pain is in the jaw, the patient should not be salivated, and blisters, if resorted to, should be applied at a spot remote from the seat of the disease. The teeth should be examined, and carious teeth extracted.

REMEDIES.—The *constitutional* remedies in common use are narcotics and tonics in combination: a favourite medicine consists of quinine in two or three grain doses, with equal quantities of extract of conium; or with half a grain, cautiously increased to two grains, of extract of stramonium. The sesquioxide of iron (ʒss. or ʒi. three times a-day). Arsenic has been tried; narcotics, too, have been used; strychnia has been given, and creasote; and, indeed, every active remedy in the Pharmacopœia. Patients have appeared to be benefited by all of them. Change of air and scene, and the use of mineral waters, have seemed to effect a cure. Croton oil in combination with the compound extract of colocynth (Ol. Tiglii ♏i. vel ij., ext. coloc. c. ʒi., divided into five pills), of which one to be given every night, with ten grains of the compound galbanum pill, was recommended by Sir Charles Bell. In an affection of the nerves of the lower jaw allied to neuralgia, muriate of ammonia, in half-drachm doses three times a-day, has been recommended by Dr. Watson. Chloroform, from ten to twenty drops, sprinkled upon a handkerchief, and cautiously inhaled, may be resorted to, to afford occasional relief from suffering; or the chloroform may be applied directly to the seat of the pain.

Among *local* applications, extract of belladonna and veratria ointment (one grain of the alkaloid to one drachm of cerate) are the most effectual. A small portion of this ointment should be smeared over the track of the nerve every day, or twice daily. An ointment containing two scruples of iodide of mercury to the ounce has also been recommended.

In a case of tic doloreux of many years' standing, which had spread from the infra-orbital nerve to the upper and lower jaw, over the scalp and down the spine, accompanied by the most excruciating suffering, after tonics and narcotics, bleeding, blistering, and salivation, had been tried in vain, and nothing afforded any relief, a stream of cold water poured upon the forehead, and allowed to trickle over the face and neck, procured refreshing sleep after the lapse of about five minutes, had the same effect on a repetition, was followed by the first good night the patient had had for weeks, and by a long interval of comparative ease. In this case the paroxysms are always accompanied with determination of blood to the parts affected, with increased heat of surface. Where these characters are absent, cold may be expected to prove less efficacious. (G.)

The rational treatment in idiopathic cases appears to be this:—Weaken the patient as little as possible; avoid producing inflammation of the part affected; and combat the more severe paroxysms by a stream of cold water poured over the part, or by the application of ice, and those of less severity by the topical use of chloroform. In cases

of sympathetic neuralgia, attend to the general health, and remove all existing causes of direct or remote irritation.

Other neuralgic affections, such as sciatica, when not merely a form of rheumatism, are to be treated on the same general principles, and by the same remedies as tic douloreux.

SCIATICA.

SYMPTOMS.—Acute aching or darting pain extending along the course of the sciatic nerve from the nates to the knee, and in some cases to the ankle. The pain is generally increased by firm pressure in the course of the nerve.

CAUSES.—The pressure of accumulated fæces, or of tumours in the course of the nerve. The ordinary causes of neuralgia in other parts.

DIAGNOSIS.—From *muscular rheumatism* by the pain being limited to the course of the nerve, and being little, if at all, affected by the motion of the limb. In sciatica dependent on constipation, the pain is generally increased by every effort to relieve the bowels.

PROGNOSIS.—With the exception of cases dependent on constipation, the disease is often very obstinate, and difficult of cure.

TREATMENT.—After unloading the bowels completely by brisk aperients, the abstraction of blood by cupping or leeches applied to the nates, or to the back of the thigh, in the course of the nerve. Dry cupping in the weak and aged. The warm or vapour bath. Friction. Aperient medicines so administered as to keep the bowels free. The general and local remedies recommended in neuralgia faciei.

ANÆSTHESIA—LOSS OF SENSATION.

VARIETIES.—*Anæsthesia*, paralysis of the nerves of sensation; *amaurosis*, of the retina; *cophosis*, of the auditory nerves; *anosmia*, of the olfactory nerves; *ageustia*, of the gustatory nerves.

Anæsthesia, or loss of common sensation, may occur separately or combined with paralysis of the voluntary muscles; it may be universal or partial, confined to one side or extending to both, and it may affect any part of the body. Facial anæsthesia is a well-known form of this disease. Numbness combined with the loss of power in the hands and forearms is not an unfrequent symptom in mimosis inquieta. (See p. 288.)

The TREATMENT must depend entirely on the pathological condition by which the disease is induced—if by pressure, the cause must, if possible, be removed; if by deficient supply of blood, stimulants must be resorted to; if by cold, the circulation must be restored. In other

cases the treatment will be that of the other diseased conditions with which it is associated. It rarely presents itself for treatment as a separate malady.

ANÆSTHESIA FACIEI.

SYMPTOMS.—Numbness or total loss of sensation in the forehead, cheek, nose, and chin, on one side of the face; also in the lips, tongue, inside of the mouth and nose, and surface of the eyeball, generally accompanied by paralysis of the temporal and masseter muscles on the same side. This loss of sensibility is sometimes attended by intense pain of the parts affected.

TERMINATIONS.—In some cases ulceration of the cornea and destruction of the globe of the eye.

RATIONALE.—Injury to the fifth pair of nerves by disease, compression, or mechanical injury.

PROGNOSIS.—*Favourable*, if uncombined with anæsthesia or paralysis of other parts. *Unfavourable*, if complicated with disordered functions of other cerebral nerves, or with symptoms of disease of the brain.

TREATMENT.—Local depletion by cupping or leeches to the temples, followed by fomentations. The internal use of mercury, so as slightly to affect the gums. If the disease, in spite of this treatment, become chronic, small blisters in front of the ear, kept open by savin ointment.

DISEASES AFFECTING THE NERVES OF VOLUNTARY MOTION.

PARALYSIS	Palsy.
LEAD PALSY	Dropped hand.
TREMOR MERCURIALIS . . .	Mercurial tremors.
PARALYSIS AGITANS	Shaking palsy.
EPILEPSIA	Falling sickness.
CATALEPSIA	Catalepsy.
CHOREA	St. Vitus's Dance.
HYSTERIA	Hysterics.
TETANUS	Locked jaw.
HYDROPHOBIA	Canine madness.

PARALYSIS—PALSY.

SPECIES.—1. Hemiplegia; 2. Paraplegia; 3. General Paralysis; 4. Partial Paralysis (including Paralysis of the Facial Nerve, Ptosis, &c.); 5. Lead Palsy; 6. Paralysis of the Insane.

1. HEMIPLEGIA.

This is the most common form of paralysis. It occurs most frequently on the left side, and usually occupies exactly one-half of the body. Sometimes, however, it is confined to the upper extremity, and in very rare instances the arm of one side, and the leg of the other, are simultaneously affected. The loss of power may also be complete or incomplete. In most cases the disease comes on suddenly, sometimes preceding and sometimes following an apoplectic attack; but occasionally, like general paralysis, it makes its approaches gradually.

SYMPTOMS.—The limbs of the affected side, if raised, fall by their own weight; the face of the same side is relaxed and void of expression, and drawn to the sound side; the tongue, when protruded, is thrust towards the palsied side; the speech is either lost, or it is thick, muttering, and unintelligible. In rare instances, the mouth is drawn to the affected side, and the tongue protruded towards the sound side. The loss of power is generally accompanied by loss of sensation, but in a few instances with heightened sensibility; the temperature of the affected side is generally much lower than that of the sound side, but occasionally it is raised above it. The mental faculties are sometimes unimpaired; but they generally suffer, as shown by impaired memory, confusion of thought, loss of power of attention, change of character, irritable temper, and depression of spirits. The pulse is often infrequent, but sometimes above its usual standard: the respiration also is slow. The bowels are generally inactive. If the patient does not speedily recover, the palsied limbs shrink and grow cold. When the disease is partial, the arm is more commonly affected than the leg. If the power of the limbs is impaired, but not lost, the arm will be raised with difficulty, and often not without the assistance of the other, the hand cannot grasp firmly, the leg will be dragged after the sound limb, and in walking the patient will be very liable to trip. In cases of recovery the leg generally recovers its power first; so that the patient can walk about, while the upper extremity still remains palsied.

CAUSES.—*Predisposing.* The same as in apoplexy. (See Apoplexy, p. 403.)—*Exciting.* An apoplectic seizure. Lesions of the spinal cord, affecting one side only. Pressure on the large vessels supplying the brain on the opposite side to the seat of the paralysis. Disease of the mitral valve, leading to detachment of a portion of the valvular deposit, its lodgment in one of the cerebral arteries, and the softening of a portion of the brain. This form of hemiplegia sometimes occurs in very early life. Palsy of the arm is sometimes caused by the weight of the body resting upon it in sleep.

DIAGNOSIS.—From hysteric hemiplegia by the history of the case, and the coincidence of other hysteric symptoms. (See Hysteria.)

PROGNOSIS.—*Favourable.* A recent, partial, and incomplete attack, without severe cerebral symptoms; youth. If attended by anæsthesia,

motory nerves. The same remedy may be applied locally; a quarter of a grain being sprinkled on a blistered surface, near the origin of the nerves affected, or near the seat of the paralysis. *Tincture of cantharides*, in doses of from twenty drops to half a drachm, has been given with advantage in some cases of paraplegia, especially in that form which depends on disease of the urinary organs. It stimulates the bladder to more healthy action, and in cases dependent on effusion into the sheath of the spinal marrow, may act favourably as a diuretic. *Oil of turpentine*, in drachm doses, suspended in mucilage, may also be given with advantage in the same class of cases in which cantharides is beneficial.

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4. PARTIAL PARALYSIS.

Particular muscles or groups of muscles are subject to attacks of paralysis, arising from injury limited to the root or trunk of the nerves distributed to them. The muscles of expression supplied by the facial nerve are the seat of a very common form of palsy; the lesser, or non-ganglionic portion of the third division of the fifth nerve, of a less common form of partial paralysis. *Strabismus* may be caused by palsy of one or more of the muscles of the eye. The paralysis of the superior branch of the third or motor oculi nerve occasions that falling of the upper eyelid and closure of the eye known as *ptosis;* and disease of the facial nerve entails, as one of its consequences, that open state of the eye due to paralysis of the orbicularis palpebrarum, which is known as *lagophthalmia;* paralysis of the laryngeal nerves occasions *aphonia;* and paralysis of the lingual nerve, the loss of speech.

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5. PARALYSIS OF THE FACE.

The motor nerves of the face being the portio dura, and the lesser, or non-ganglionic, portion of the third division of the fifth, and the sensitive nerves the first and second divisions, with the ganglionic portion of the third division, of the fifth nerve, it is easy to trace facial paralysis to its source. In perfect paralysis of the face, the portio dura and motor branch of the third division of the fifth suffer jointly: when the latter alone is affected, the motions of the jaw on that side are paralysed, and in this case there is usually some loss of sensibility; but as the disease is confined to the muscles employed in mastication, there is no distortion of feature, beyond a flattening of the affected side of the lower jaw, and of the temple.

SYMPTOMS.—In palsy of the muscles supplied by the facial nerve, the expression of countenance is very peculiar. The features are drawn to the sound side, so that a straight line passing through the

3. GENERAL PARALYSIS.

Sometimes the disease is of greater extent than is implied in either of the terms hemiplegia or paraplegia, and is known as general paralysis. It comes on either suddenly or gradually; if suddenly, from extensive injury or sudden effusion of blood on the medulla oblongata, or cervical portion of the spinal marrow; if gradually, it begins in the toes or fingers, and thence extends over the entire body, and is due to chronic disease of the brain or spinal cord. In most cases the sensibility is unimpaired; more rarely both sensation and motion are lost. The functions of the intellect generally suffer at the same time, and occasionally all the faculties of the mind are paralysed. This form of paralysis is of rare occurrence; the *prognosis* is highly unfavourable; the *treatment* the same as in less extensive affections of the same kind.

TREATMENT OF PARALYSIS.

The *indications* for the treatment of the foregoing forms of paralysis are the same. They consist: I. In the use of remedies appropriate to the diseased condition on which the palsy depends; II. In the use of remedies calculated to act directly on the parts affected; and III. In the relief of incidental symptoms.

I. For the first indication, see Apoplexy, Myelitis, Spinal Arachnitis, and other diseased conditions of the brain and spinal marrow.

II. This indication is fulfilled by friction with the flesh-brush, or with stimulating liniments; by blisters; by the actual cautery; by electricity (most conveniently applied by means of the electro-magnetic apparatus), and by galvano-puncture, salt-water baths, shampooing, the warm or hot-water *douche*, and, when the power of the extremities has in some degree returned, by exercise. These remedies are inapplicable in the early stage of paralysis depending on acute disease of the brain or spinal cord. They should not be applied till all symptoms of inflammation have disappeared, and the disease has assumed a chronic form.

III. When, as in cases of paraplegia and of general paralysis, the bladder and rectum are involved, the frequent use of the catheter, and the injection of the bladder with warm water, are of great importance. The patient must be kept clean, his position must be frequently changed, and if bed-sores should form, he must be placed upon a rheiocline or water-bed.

REMEDIES.—*Strychnia.* In cases not dependent upon inflammation or disease of the brain or spinal cord, and where the palsy arises from the long disuse of the limbs, or from exhaustion of the nervous power, strychnia in doses of a sixteenth or twelfth of a grain, two or three times a-day, cautiously increased, may be given with advantage. Its action on the system is indicated by twitchings of the paralysed muscles, but these taken as indications of returning power are exceedingly delusive, as they seem to depend on an affection of the excit

motory nerves. The same remedy may be applied locally; a quarter of a grain being sprinkled on a blistered surface, near the origin of the nerves affected, or near the seat of the paralysis. *Tincture of cantharides*, in doses of from twenty drops to half a drachm, has been given with advantage in some cases of paraplegia, especially in that form which depends on disease of the urinary organs. It stimulates the bladder to more healthy action, and in cases dependent on effusion into the sheath of the spinal marrow, may act favourably as a diuretic. *Oil of turpentine*, in drachm doses, suspended in mucilage, may also be given with advantage in the same class of cases in which cantharides is beneficial.

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5. PARALYSIS OF THE FACE.

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Symptoms.—In palsy of the muscles supplied by the facial nerve, the expression of countenance is very peculiar. The features are drawn to the sound side, so that a straight line passing through the

eyebrows and mouth respectively would meet at an angle within a short distance of the sound side of the face. In other words, the sound side appears shorter and narrower than the paralysed side. The two sides of the face wear so different an expression that the patient is said to laugh on one side and cry on the other; or the countenance has a cynical and contemptuous look. The patient is unable to frown on the affected side, and when desired to shut the eyes, that on the sound side is firmly closed, while that on the paralysed side is either partially closed or remains wide open, the pupil, at the same time, being drawn upwards and inwards. When told to inspire through the nostrils, as in taking snuff, the nostril of the affected side collapses. If the patient is desired to blow, the air escapes from the paralysed side; so also with the food, when the patient swallows, and with the saliva, when he spits: the saliva dribbles from the palsied side, and the food either slips from the mouth, or collects between the teeth and jaw, and the cheek is often bitten between the teeth. The power of whistling is also lost, and when the patient speaks, laughs, cries, sneezes, or coughs, the deformity is increased, the paralysed side remaining motionless, while the sound side is thrown into still stronger contortions. The cheek on the affected side is flaccid, and swells during strong expiration. The labial consonants, *b*, *p*, and *f*, are imperfectly sounded; but the patient can speak distinctly when the lower lip on the affected side is supported by the finger. The sensation of the affected side is generally unimpaired.

The annexed woodcut (Fig. 46) is from a case of paralysis of the facial nerve, first seen by the Editor as an out-patient of King's College Hospital, and afterwards admitted under Dr. Todd. The right side is the seat of the paralysis; and the two sides present the striking contrast just described, the right side having a sad, and the left a merry, expression—a difference readily perceived by covering one side of the face and then the other.

Fig. 46.



The second woodcut (Fig. 47, page 423) is also taken from a sketch of a patient seen by the Editor among the out-patients of King's College Hospital. It shows the expression of the face when a patient so affected is desired to shut the eyes. In this instance the left side is the seat of the disease; and the eye of that side cannot

be closed, while the eye is firmly shut on the right side. The whole face is drawn forcibly to the sound side, and all the features of that side are strongly contracted.

Fig. 47.



The third figure (Fig. 48) exhibits paralysis of the left facial nerve in a child, described as laughing and crying on the right side, but as unable to close the left eye.

These illustrations of paralysis of the facial nerve may be advantageously compared with the wood-cut (Fig. 49, page 424), which shows the state of the face in a well-marked case of hemiplegia affecting the left side. The eyelids of the paralytic side are closed, though less firmly than those of the sound side, while the features of the two sides present the same contrast, though in a less degree, than in the preceding illustrations. (Figures 48 and 49 are taken from Marshall Hall's Principles of Medicine, p. 279.)

Fig. 48.



DIAGNOSIS. — Unmixed paralysis of the facial nerve is distinguished by the face retaining its sensibility; by the function of hearing being intact; by the unaltered state of the pupil, and the eyesight being unaffected (except as the result of the open state of the eye); by the muscles of mastication retaining their power; by the speech being only affected as above stated, and being distinct when the paralysed lip is supported by the finger; and by the absence of cerebral symptoms. Complication with deafness would show that the other division of the seventh nerve was affected. The addition of anæsthesia would show that the fifth nerve was also implicated; and cerebral symptoms would indicate that the seat of the disease affecting the nerves was within the skull and not external to it. From hemiplegic paralysis by the

retention, in the last-named form of palsy, of power to close the eye.

Fig. 49.



PTOSIS, or closure of the eye from palsy of the superior branch of the third nerve, may be looked upon as a more serious disease than palsy of the facial nerve, and as more probably due to disease of the brain.

PROGNOSIS.—*Favourable.* When the paralysis does not extend beyond the parts supplied by the facial nerve. The disease is often cured in about three weeks or a month. — *Unfavourable.* Complication with paralysis of other nerves, or with symptoms of disease of the brain. Inflammation of the conjunctiva, and in rare cases, ulceration of the cornea, and destruction of the eye of the affected side, are consequences of the loss of power in the muscles of the eyelids.

CAUSES.—Wounds and mechanical injuries; the pressure of tumours; effusions into and around the sheath of the nerve; cold.

TREATMENT.—If febrile symptoms are present, bleeding from the arm; in other cases, cupping or leeches behind the ear, followed by a blister to the same part; aperients as required; and blue pill or calomel given so as to slightly affect the gums. (Pil. hydrarg. gr. iii. Pulv. opii gr. $\frac{1}{4}$, three or four times a-day.)

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6. LEAD PALSY—DROPPED HAND.

SYMPTOMS.—The hands are generally first affected, and in some cases the forearm also suffers. It begins by a feeling of weakness in the fingers, extending to the wrists, and rarely beyond them. There are at the same time shooting pains in the forearms, arms, and shoulders. The parts affected, after a time, waste from disuse, and the hand drops powerless from the wrist. The disease is generally preceded by colic, but may occur independently of it.

DIAGNOSIS.—The seat of the palsy, assisted, in many cases, by the discovery of a blue line on the gums.

PROGNOSIS.—Favourable in first attacks, and in slight cases. In other instances, recovery after a long course of treatment. In some cases, incurable.

CAUSES.—This form of paralysis attacks plumbers and glaziers, oil-painters, enamel-card makers, fishmongers who use lead counters, men employed in lead-works, and persons who drink water conducted through new leaden pipes or kept in new leaden cisterns, the danger being in exact proportion to the purity of the water.

TREATMENT.—The hand to be supported by a splint. Iodide of potassium to be given in five-grain doses three times a-day with any tonic infusion. The external remedies are electricity, shampooing, the warm-water *douche*, friction with the flesh-brush, or with stimulating liniments. Strychnia, in doses of from the sixteenth to the twelfth of a grain, three times a-day, and cautiously increased, may be given after the iodide of potassium has failed.

PROPHYLAXIS.—Scrupulous cleanliness; the hands to be washed in soap and water, or in water containing soda or pearlash, before meals; sulphuric acid lemonade as a beverage.

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7. PARALYSIS OF THE INSANE.

This form of paralysis has some peculiarities. It comes on at a variable interval after alienation. It appears first in the tongue, and affects the pronunciation, and thence extends to the extremities, of which the lower are commonly first affected. The progress of the disease is gradual, but it terminates at length in complete paralysis, with palsy of the bladder and sphincter ani, of the muscles of deglutition, and of the respiratory muscles. The patient often dies asphyxiated. The sensibility is little impaired. The common duration of this malady is four or five years.

TREATMENT.—This form of disease is dependent on progressive softening of the brain, and does not admit of cure or of material relief by medicines. The treatment will have to be directed to the relief of such symptoms as may happen to be present in each case.

TREMOR MERCURIALIS—MERCURIAL TREMORS—THE TREMBLES.

SYMPTOMS.—The paralysis usually shows itself first by weakness in the arms, which gradually increases. It is accompanied by slight convulsive twitchings, followed by tremors, increasing in violence till the patient is obliged to abandon his occupation. The trembling gradually extends to the lower extremities, and at length to the entire body. All attempts to move bring on the trembling, which ceases when the limbs are supported, and the body is at rest. The patient dances rather than walks; he is unable to grasp objects; the speech is hurried and abrupt, and in extreme cases he cannot even masticate his food. If the patient continues to expose himself to the poison, rest-

lessness, sleeplessness, and delirium supervene. Salivation is sometimes present, but more generally absent. The general health is impaired, and there are nausea and anorexia, a dry skin and a furred tongue; but there is no disorder of the circulation or respiration, and no colic. In very mild cases the symptoms are those of Mimosis Inquieta (see p. 288).

Among the minor effects of working with mercury may be mentioned a peculiar brittle state of the teeth, causing them to chip constantly, and exposing them to early decay.

DIAGNOSIS.—From *paralysis agitans*, by the history of the case, and the absence of trembling when the limbs are supported.

PROGNOSIS.—Generally favourable, if the patient can contrive to quit his employment.

CAUSES.—The process of water-gilding; employment in quicksilver mines; long exposure in any way to the fumes of mercury, or to the absorption of the oxide by the skin.

TREATMENT.—A temporary cessation of employment; a combination of tonics and sedatives (as in Mimosis Inquieta, p. 288); preparations of iron; a generous diet, with a moderate allowance of wine; the shower-bath.

PROPHYLAXIS.—Cleanliness and free ventilation of workshops. In those who inhale mercury, an arrangement by which the fumes can be carried off, such as a funnel terminating in a chimney; eggs swallowed two or three times a-day; the free use of milk as an article of diet; in those who handle mercury, the use of gloves.

PARALYSIS AGITANS—SHAKING PALSY.

SYMPTOMS.—Weakness and trembling, usually commencing in the hands and arms, but sometimes in the head, and gradually extending over the whole body. At length, the trembling becomes incessant; and when the patient attempts to walk, "he is thrown on the toes and fore part of the feet, and impelled unwillingly to adopt a running pace, being in danger of falling on his face at every step." In a still more advanced stage, the shaking continues during sleep; the patient cannot carry food to the mouth; and mastication and deglutition are performed with difficulty. The agitation at length becomes so violent as to prevent sleep; the body is bent forward, with the chin upon the sternum; articulation is impaired or entirely lost; the urine and fæces pass involuntarily, and coma and slight delirium close the scene. In some cases, the muscles of respiration are affected, and the breathing becomes extremely frequent. (In one case occurring in a vigorous young man, 73 in the minute, with a pulse of 72.—G.)

DIAGNOSIS.—The trembling continuing even when the limbs are supported, and the peculiar gait.

PROGNOSIS.—Unfavourable in persons advanced in life. Less unfavourable when, as in rare instances, it occurs in persons in the vigour of life.

CAUSES.—*Predisposing.* An advanced period of life.—*Exciting.* Hard drinking; previous attacks of rheumatism; obscure disease of the spinal cord.

TREATMENT.—In persons advanced in life, a combination of stimulants and sedatives is indicated; in persons previously intemperate, the treatment proper to delirium tremens. In younger persons, cupping and counter-irritants to the spine, with remedies appropriate to the state of the system. If plethora is present, depletion; if great constitutional debility, preparations of steel, as the sesquioxide or sulphate of iron in full doses.

EPILEPSIA—EPILEPSY.

SYNONYM.—Falling sickness.

DEFINITION.—A fit, consisting in a sudden loss of sense and power of motion, frequently preceded by a shriek, attended by convulsions, and generally followed by coma, the fits recurring at irregular intervals.

SYMPTOMS.—The patient is seized suddenly, or after a short warning, with loss of consciousness and loss of power, so that, if he is standing, he immediately falls, or is thrown to the ground. The fit, which is frequently preceded by a loud, piercing cry, consists in strong convulsive motions of the limbs and trunk of the body, and spasms of the muscles of the face and eyes, producing various distortions of the countenance. The brows are knit; the eyes fixed and staring, or turned up beneath the lids so as to display the whites of the eyes. The hands are firmly clenched, and the arms are tossed about. The breathing becomes gasping and difficult, or is altogether suspended; the heart beats violently; the face is turgid and livid; foam, often bloody, issues from the mouth; the jaws are contracted with great force, so that the under lip or the tongue, if protruded, is apt to be severely injured. The fæces, urine, and semen are sometimes expelled, and there is occasionally rigidity of the penis. After the convulsions have continued from one or two to five or ten minutes, they cease altogether, and leave the patient motionless, but in a state of insensibility, and under the appearance of a profound sleep. He gradually recovers, and, if left to himself, will generally sleep for some hours. Sometimes there is a succession of fits, with intervals of torpor, lasting for several hours.

There is a form of epilepsy, of frequent occurrence, called by the French *petit mal*, in contradistinction to the foregoing, which is designated the *grand mal*. In consists in sudden and transient giddiness, with loss of consciousness, confusion of mind, and unsteadiness of gait, accompanied in some instances by slight convulsions. Such slight

fits are often followed by a period of great confusion of intellect, and even of maniacal incoherence. (In one case that came under my notice every fit of epilepsy was followed by an unconscious exposure of the person.—G.)

Premonitory symptoms.—The fit is frequently ushered in by premonitory symptoms, such as pain in the head; lassitude; disturbance of the senses, consisting in a bright circle of colours before the eyes, or a sudden light, or muscæ volitantes, or, in rare instances, spectral illusions; or there is a loud noise in the ears; or an offensive smell; or a bitter taste: unquiet sleep; unusual dread; palpitation of the heart; coldness of the joints; fluttering at the epigastrium; vomiting; a sensation of cold, or a pain arising in some part of the extremities, and gradually creeping upwards until it reaches the head (the *aura epileptica*), when the patient is instantly deprived of sense, and falls as above described. (In a case that recently came under my notice, every fit was preceded by the utterance of the same incoherent sentence, to which the patient attached no meaning.—G.) In the majority of cases, the fit is not preceded by any warning. The fits occur at very variable intervals; sometimes in the day, sometimes at night, during sleep, and there are often several fits in the twenty-four hours; in other cases, there are intervals of months or years.

CAUSES.—*Predisposing.* Epilepsy or insanity in parents or ancestors; scrofula; malformation of the head; the male sex; debility in nervous persons; dissipation, intemperance, self-abuse, and excessive or suppressed discharges.—*Exciting.* Mechanical, chemical, or mental stimuli; sudden fright; fits of passion, or any vehement emotion of the mind; irritation; sexual intercourse; plethora of the vessels of the head; worms; dentition; acute pain; excessive evacuations; suppression of accustomed discharges; tumours compressing the brain, or any part of the nervous system. Epilepsy sometimes occurs as a symptom of irritant poisoning; and is not infrequent in poisoning by arsenic.

DIAGNOSIS.—From *hysteria*, by the total suspension of consciousness, the solitary cry, and the deep sleep which succeeds the fit. From *feigned* epilepsy, by the total insensibility, extending even to the retina. From *apoplexy*, by the transient nature of the fit, the absence of the stertorous breathing, and, in most cases, of paralysis. By the motions of the voluntary muscles in epilepsy being increased, in apoplexy totally suspended.

PROGNOSIS.—*Favourable.* The disease being sympathetic, occurring before the age of puberty, and arising from obvious exciting causes easy of removal. In females being connected with some functional derangement of the uterine system.—*Unfavourable.* The reverse of the above. The disease coming on after the age of puberty; hereditary predisposition; scrofulous diathesis; long previous continuance of the malady, and frequent occurrence of the fits; misshapen

skull; the epileptic physiognomy; impairment of the memory and judgment; fatuity, or paralysis.

TREATMENT.—I. During the fit; II. During the interval.

During the fit.—The patient must be prevented from injuring himself, and care must be taken that there is no pressure on the vessels of the neck. The patient should therefore be placed, if possible, on a soft bed, the neckcloth and shirt-collar should be loosened, and the violent convulsions should be restrained by the bystanders. By way of precaution, and to prevent the tongue from being bitten, a piece of soft wood, or a pad of linen, should be placed between the teeth. When the fit occurs frequently during sleep, and the tongue is apt to be severely bitten or torn by the teeth, the patient should wear a smooth rounded guard, fitting closely to the teeth, above and below. After the fit, the patient should be allowed to sleep; and if much exhausted, may take some slight stimulant.

In the interval.—The recurrence of the fit is sometimes prevented—

1. By removing all causes of irritation, as constipation, intestinal worms, the irritation of teething, &c.

2. By avoiding the exciting causes, such as over-distension of the vessels of the head, however induced; fits of passion, or other violent emotions of the mind; intemperance, dissipation, or other bad habits.

3. If the patient be of a plethoric habit, by occasional bleeding; abstemious diet; issues or setons in the neck; irritation in the course of the spine with antimonial ointment; frequent aperients, &c.

4. If the patient is weak and irritable, by tonics; as cinchona, quinine, sulphate, oxide, and valerianate of zinc, sulphate and sesquioxide of iron, sulphate of copper, or the cuprum ammoniatum, nitrate of silver (a remedy which is objectionable as apt to cause permanent discoloration of the skin), and liq. arsenicalis; combined with regular hours, early rising, regular exercise, nourishing but not stimulating diet, and cold bathing, or the shower-bath.

5. If the disease occur in females, the treatment must be regulated by the state of the uterine function. If amenorrhœa with anæmia, or anæmia alone, be present, full doses of steel; if amenorrhœa with plethora, the treatment proper to plethora; if dysmenorrhœa, the treatment recommended for that disease; if leucorrhœa or menorrhagia, tonics and sedatives, with astringent injections; if the nervous symptoms attendant on the change of life, and on the debilitating diseases of the adult female, the same combination of tonics and sedatives as recommended in Mimosis Inquieta (p. 288).

6. If there is a syphilitic taint, mercury, or the iodide of potassium, may be given, as in other secondary cases.

The most important point of the treatment is to ascertain the exciting causes, and to remove or avoid them.

REMEDIES.—*Immediately before the fit.* Pressure on the carotids; a ligature between the parts from which the *aura* first proceeds and the brain, as round the thumb or little finger when it begins there; a

strong mental effort; violent exercise; violent irritation of the nostrils, with snuff, or strong-smelling salts; dashing cold water over the face and head; an emetic; a full dose of opium or laudanum.—*In the intervals.* The metallic and vegetable tonics already specified; wormwood; the cardamine pratensis; the misletoe and oak-bark, in doses of two drachms two or three times a-day; gratiola; mugwort; narcotics and sedatives, as opium, lactuca, conium, stramonium, belladonna, and digitalis; antispasmodics, as valerian, assafœtida, musk, and castor; carbonate of potass; turpentine, recommended on high authority, and indicated wherever worms are suspected to exist. Nux vomica and strychnia; electric sparks drawn from the head; the inhalation of oxygen gas. In cases preceded by the aura, division of the nerve running from the seat of the aura or amputation of the part, have been recommended, but they are of very doubtful efficacy. The same observation applies to Dr. Marshall Hall's recommendation of tracheotomy in cases of epilepsy attended with extreme difficulty of breathing.

Where no obvious cause of irritation, and no marked deviation from the usual state of health, can be found, the treatment is, and must be, purely empirical. The balance of authority is in favour of tonics, of which the sulphate of zinc, in doses increased from two or three grains up to a scruple or half a drachm, three times a-day, is the best. It may be given in combination with sulphate of magnesia, in doses sufficient to insure the free evacuation of the bowels. In confirmed cases all remedies are useless.

CATALEPSIA—CATALEPSY.

SYMPTOMS.—Catalepsy is an extremely rare disease, allied to those of the present section. Its essential features are, a fixing of the body in the position in which it happens to be at the moment of the seizure, or in which it may be placed during the fit, accompanied by total insensibility. The fit itself is rarely, if ever fatal; but the intellectual faculties seem to suffer by its frequent repetition.

A lad of about fourteen years of age, a playmate of my own, was subject from childhood to this disease. He was often seized in the midst of his sports, at irregular intervals, and without any previous warning, and fixed like a statue in the attitude in which he happened to be at the moment. The fit rarely lasted more than one or two minutes, and when it ceased, he resumed the sport in which he had been engaged with a slight air of surprise and embarrassment. He was found dead in a bath, into which he had fallen.—(G.)

The *causes* of this disease are obscure, and little is known of its appropriate treatment. The general principles on which it should be conducted are the same as those of epilepsy. Existing irritation must be removed, and any occasional determination of blood to the head must be met by appropriate remedies.

CHOREA SANCTI VITI—ST. VITUS'S DANCE.

SYMPTOMS.—The disease generally sets in with slight convulsive movements of the face or of one of the lower extremities, which gradually extend and increase in severity until they embrace one side of the body, or the whole frame. When fully formed, the presence of the disease is easily recognised by the following symptoms. The patient is observed to be lame. The affected leg, in walking, is not lifted as usual, but is dragged along, as if the whole limb were paralytic; and when it is attempted to be lifted, that motion is unsteadily performed, the limb becoming irregularly and ludicrously agitated. Even when the extremity is at rest, the foot is often agitated by involuntary motions, turning it alternately outwards and inwards. The upper extremity of the same side is affected by similar convulsive movements, so that in attempting to raise anything to the mouth, the patient often jerks it over the head, or after repeated attempts, swallows hastily, and with ludicrous grimaces. If the patient is told to hold the arm extended, the fingers cannot be kept steady, and the arm is soon withdrawn, the movement being generally accompanied or followed by a grimace. The muscles are usually quiet during sleep; but there are exceptions to this rule. The health is generally but slightly impaired; but constipation is an almost constant accompaniment, and there is sometimes loss of appetite, a foul tongue, and offensive breath. In females, the uterine functions are sometimes disordered.

RATIONALE.—A disorder of the reflex function; irritation of the bowels or uterus being communicated to the spine, and reflected as convulsions on the voluntary muscles, the strange distortions of the disease being due to the conjoint action of the will and of the excito-motory system?

CAUSES.—*Predisposing.* General weakness and irritability of the nervous system; youth (from 7 to 15 years of age); female sex. It may occur in adults of both sexes to the age of seventy. *Exciting.*—Intestinal irritation from constipation or worms; uterine irritation; strong mental excitement, as from fright or anger; blows or falls; disease, or irritation of the spinal cord or its membranes.

DIAGNOSIS.—From *hysteria*, by the grotesqueness of the movements, and the absence of convulsive affections of the respiratory system.

PROGNOSIS.—Favourable in the great majority of cases.

TREATMENT.—*Indications.* I. To remove causes of irritation. II. To improve the general health.

I. By far the most common cause of irritation is in the bowels, and purgatives, judiciously and perseveringly administered, are the chief remedies; in most cases, perhaps, the only efficient ones. A powder or pill consisting of equal parts of hydr. c. cretâ and pulv. rhei (the dose varying with the age) may be given every night, and a dessert or table-spoonful of castor-oil, or other simple aperient, every morning.

More active purgatives may be substituted if necessary. The bowels should be kept open once or twice daily, but hypercatharsis should be carefully avoided. The evacuations should be inspected daily; and the purgative plan be persevered in till the discharges assume a healthy appearance. In many cases, nothing more will be required.

If the source of irritation is in the uterus, remedies appropriate to the existing disorder of that organ must be given. If there is tenderness of the spine, the case should be treated as one of spinal irritation.

II. The general health may be improved by tonics, of which the sulphate of zinc, and the sulphate or sesquioxide of iron, in full doses, are the best, aided by cold affusion or the shower-bath, with nourishing diet, fresh air, and regular exercise. These remedies may be used in combination with a course of aperient medicines; but whatever else is done, purgatives should never be omitted.

REMEDIES.—Tonics; among metals—sulphate and sesquioxide of iron (from ʒss. to ʒi. of the sesquioxide with senna electuary, three times a-day); the oxide, sulphate, and valerianate of zinc; the ammonio-sulphate of copper; nitrate of silver, and the preparations of arsenic: among vegetables—bark, quinine, and strychnia. Narcotics, and antispasmodics. Oil of turpentine; cod-liver oil; electricity; and sulphur baths.

HYSTERIA—HYSTERICS.

SYMPTOMS.—The disorder occurs in paroxysms or fits, generally preceded by yawning, stretching, dejection of spirits, shedding of tears, alternate flushings and paleness, difficulty of breathing, sickness at the stomach, and palpitation of the heart; there is often an acute pain in the left side, about the flexure of the colon, with a sense of distension, giving the idea of a ball or globe rolling itself about and gradually advancing upwards until it gets into the stomach, whence, rising to the throat, it occasions, by its pressure, the sensation of an extraneous body lodged there (*globus hystericus*). The fit having arrived at its height, the patient appears threatened with suffocation; the face is flushed, the nostrils distended, the abdomen protruded and tympanitic, the head thrown forcibly back, and the limbs are strongly convulsed. The patient bursts into violent fits of laughter, sobbing, or screaming, utters incoherent expressions, and is in a state of temporary delirium; from which, however, she is readily roused so as to answer questions rationally. The spasms at length abating, a quantity of flatus is evacuated upwards, with frequent sighing and sobbing; a large quantity of limpid urine is discharged; and the patient recovers the exercise of sense and motion, without retaining any distinct recollection of what has taken place; feeling, however, a severe pain in the head, and a soreness over the whole body.

The fit sometimes appears in a less-marked form, with sudden

insensibility, laborious breathing, swollen neck, flushed cheeks, and a closed and trembling eyelid; and the patient recovers, crying and sobbing.

CAUSES.—*Predisposing.* Female sex; celibacy; the age from puberty to the fifty-fifth year; studious and sedentary life; grief; anxiety of mind; delicate health; plethora; the scrofulous diathesis. It is rare in the male sex, but liable to occur, under mingled debility and mental excitement. *Exciting.*—Constipation; dyspepsia; flatulence; excessive evacuations; suppression of the menses or lochia; plethora; violent emotions of the mind; imitation or sympathy; tight lacing, or other impediments to the breathing. Spinal irritation.

DIAGNOSIS.—From *epilepsy*, by the insensibility not being complete, and by the convulsive motions being subject to control by a strong effort of attention; by the marked affection of the respiratory muscles as shown in sighing and sobbing, cries and laughter; by the absence of distortion of the features, and by the peculiar trembling of the eyelid. (This latter sign is of great value, for wherever it is present, whatever the name given to the disorder, whether hysteria, catalepsy, trance, or mesmeric slumber, it is a sign of safety, and strongly suggestive of cold affusion.—G.) From *mimosis inquieta*, by the marked character of the fits; but hysteria is often superadded to the group of symptoms which bears that name.

PROGNOSIS.—*Favourable.* In males affected with hysteria there is some ground to apprehend future mental unsoundness.

TREATMENT.—I. During the fit. II. During the intermissions.

During the fit.—In general, nothing more is necessary than to dash cold water repeatedly into the face; to rouse the patient by speaking to her in a loud tone of voice, to unloosen the stays, and to apply ammonia to the nostrils. Assafœtida, fetid spirits of ammonia, ether, valerian, castor, opium, and the so-called antispasmodics, are often given, but with little effect.

The persevering use of cold water as a shock, not only serves to remove the existing attack, but often effects a cure after antispasmodics have been used in vain. In a young man who had had repeated attacks of hysteria in a marked form, and who had taken the strongest and most nauseous remedies for several weeks without effect, this simple means speedily effected a cure. He has since become the victim of hopeless melancholia. I have seen a prompt and a permanent cure follow the disuse of tight lacing. (G.)

During the intermissions—The bowels must be kept free, without being irritated by violent purgatives. If there is extreme debility, stimulants will be required; if a less degree, tonics, of which the metallic tonics are the best; if plethora be present, a regulated diet; and in extreme cases, the abstraction of blood; if anæmia, the preparations of steel; if the symptoms of mimosa inquieta, a combination of tonics and sedatives. (See p. 288.) If there is spinal tenderness,

blisters or tartar-emetic ointment to the spine. Disorders of the uterine functions require the remedies proper to the particular disorder present. Change of scene, cheerful society, regular exercise, and the shower-bath may be prescribed with advantage. The diseases or states of system with which hysteric fits are most commonly combined are, plethora, anæmia, chlorosis, and mimosa inquieta. (See those diseases, Chap. I. p. 279.)

Hysteria is common in perverse and irritable females, and in persons of both sexes who possess little self-control. The education of young girls of the present day is admirably calculated to promote hysteria, combining an excessive mental, with a defective physical, education, causing excitement of mind with bodily debility, a combination always capable, without local disease, of producing hysteria in persons predisposed to it.

Hysteria is rare in strong-minded females: and of three cases which have come under my notice in the other sex, two occurred in men remarkable for their want of self-control, one of whom is now insane; and the third was a single attack occurring in a medical student, on obtaining a prize for which he had long been anxiously striving. (G.)

In the foregoing description, the term hysteria has been restricted to a disorder accompanied by fits, but it is usual to give to this term a much more extended meaning, and to designate as hysterical all the more obscure diseases of females. This indiscriminate usage of the term often leads to unsatisfactory views of the real condition with which we have to do. Thus, extreme tenderness of the skin of the abdomen, or neuralgic pain of the muscles, often confounded by careless observers with peritonitis, is designated as hysterical, so also with pleurodyne, which is apt to be mistaken for pleuritis. There are other affections, however, which may still, without impropriety, be designated as hysterical; such as aphonia, dysphagia, dry noisy cough, dyspnœa, hiccup, flatulence, paralysis, syncope, brow ague, irritable breast, besides a large class of anomalous nervous affections, which often closely simulate diseases of a more formidable character. The mind of hysterical females is, doubtless, often in a state bordering on insanity; an intense desire for sympathy being the mainspring which sets the strange machinery in motion. The mind, in fact, is in the same state as the body; and as the convulsive movements are partly due to an excited state of the reflex function, and partly to an absence of self-control, so the extraordinary mental condition is the effect of the extension of the same condition of the nerves to the brain, accompanied by the same absence of self-control.

We shall often be greatly assisted in determining the true nature of these anomalous diseases by observing one or other of the following circumstances:—1. That the patient, seeming to labour under a disease which is usually accompanied by emaciation and a decided appearance of ill-health, loses neither flesh nor colour; so that if she has long been confined to bed with paralysis, her limbs remain plump and firm; if she has not been able to swallow for weeks, or is troubled with incessant vomiting, she seems to have taken at least three meals a-day;

if she has been a martyr to excruciating pain, her face is as free from wrinkles as if she had never had a care or a pang. 2. That though, in some anomalous cases, the patient seems to be altogether insensible, the pulse beats as usual, the face has its natural colour, and while all other parts are motionless, the eyelids vibrate rapidly, and especially when any effort is made to rouse her. 3. That a great proportion of these affections are associated more or less with disorders of the respiratory function. 4. That the patient is, or has been, subject to flatulence, borborygma, globus hystericus, or well-marked hysterical fits. In the treatment of these disorders, the medical man must combine great firmness with kindness, and not spare cold water. Cold affusion is the only remedy which can be relied on, and is worth a whole pharmacopœia of antispasmodics. (G.)

TETANUS—LOCKED JAW.

SYNONYMS.—Trismus. Rigid spasm.

VARIETIES.—1. Traumatic Tetanus. 2. Idiopathic Tetanus; including Tetanus Neonatorum.

SYMPTOMS.—Sense of stiffness in the back part of the neck, rendering the motion of the head difficult and painful; difficulty in swallowing; pain, often violent, referred to the sternum, and thence shooting to the back; spasm of the muscles of the neck, pulling the head strongly backwards; rigidity of the lower jaw, which increasing, the teeth become so closely set together, as not to admit of the smallest opening, when the affection is called *trismus*, or *locked-jaw*.

If the disease proceed further, it soon involves the muscles of the trunk and spine, so that the whole body is bent forcibly backwards (*opisthotonos*), or forwards (*emprosthotonos*), or to the side (*pleurosthotonos*).

At length, every organ of voluntary motion partakes of the disease; the extremities are rigidly extended; the abdominal muscles strongly retracted; the eyes fixed; the forehead drawn up into furrows; the jaws strongly closed; and the whole countenance exhibits the most shocking distortion. These violent contractions occasion the most excruciating pain. The pulse is accelerated, the respiration suspended or laborious, the heat of the surface greatly increased, and the skin covered with a profuse perspiration. A partial remission of the symptoms occasionally takes place every ten or fifteen minutes, but they are renewed, with aggravated torture, from the slightest causes, even the least motion of the patient, or the touch of an attendant. If the patient fall asleep, the muscles relax.

In fatal cases, the symptoms rapidly increase in severity; there is urgent dyspnœa, with an agonising sense of suffocation; a cold clammy sweat; a small and imperceptible pulse; froth or bloody mucus at the mouth; the countenance becomes livid; delirium sometimes super-

venes, and the patient dies exhausted, or suffocated by the rigid spasm of the muscles of respiration.

The *duration* of the disease varies. One case of acute tetanus is on record which proved fatal in a quarter of an hour; the common duration of fatal cases is from four to eight days. In cases of recovery, the duration varies from a week to two or three months.

LATENT PERIOD.—From a few minutes to ten weeks. Most common period, from the fourth to the fourteenth day.

CAUSES.—*Predisposing.* The male sex; robust and vigorous constitution; warm climates; the period of infancy.—*Exciting.* Vicissitudes of temperature; exposure to cold and damp; or to excessive heat; great fatigue; wounds, especially punctured wounds of the extremities; injuries of nerves or tendons by puncture or laceration; the presence of irritating substances in the stomach or alimentary canal (the common cause of the *tetanus neonatorum*); cessation of habitual discharges; irritation of the extremities of the nerves; affections of the mind; strychnia, and the plants of which it is the active principle; some of the more active irritant poisons.

ANATOMICAL CHARACTERS.—Not constant. In some cases there are signs of inflammation in the spinal cord and its membranes (centric tetanus); but in many instances those parts are perfectly healthy, the disease being due to some remote irritation conveyed to the spinal marrow, and reflected on the muscles (eccentric tetanus). Traces of injury to the nerves in cases of traumatic tetanus. The muscles often ruptured and gorged with blood.

PROGNOSIS.—Extremely unfavourable; more so when the disease arises from wounds or injury to the nerves than when proceeding from cold; when it comes on suddenly, and soon after the receipt of an injury, and rapidly increases in severity, than when slow in its progress; when the spasmodic contractions quickly succeed each other, and are excited by very slight causes, than when there is a considerable interval. Survival beyond the fourth day is a favourable circumstance.

TREATMENT.—I. Of traumatic tetanus. II. Of idiopathic tetanus.

In *traumatic tetanus* the nerve supplying the injured part should be divided as early as possible in the disease. The rest of the treatment is that of idiopathic tetanus.

In *idiopathic tetanus*, the treatment which is most justified by experience is that by active purgatives; and of these, turpentine is the best—an ounce of the spirits of turpentine with an equal quantity of castor-oil, and if this should not act freely, one or two drops of croton-oil in addition may be given at short intervals, till the bowels are freely moved. Or, the croton-oil, in doses of one, two, or three drops may be given alone. It has the advantage of being readily introduced into the mouth, and of being swallowed gradually, without unnecessary effort. If the mouth continue firmly closed, other purgatives and medicines given by the mouth should be introduced by

means of a flexible tube passed through the nostrils, or behind the last molar tooth. Clysters have also been recommended, and may be administered in those cases where the bowels do not readily respond to purgative medicines taken by the mouth. During the fits, the patient should be brought under the influence of chloroform.

If there is tenderness in the spine, a blister may be applied to the whole length of it, or a bladder of ice.

The rest of the treatment will consist in giving wine and nourishment at short intervals, and keeping the patient as quiet as possible.

REMEDIES.—Narcotics and sedatives, such as opium, morphia, hydrocyanic acid, digitalis, stramonium, tobacco, belladonna, hyoscyamus, conium, musk, camphor; all of which have been given in enormous doses, with very doubtful advantage. The Indian hemp is the best of this class. It is given in doses of two or three grains, every second or third hour. In ten out of twelve cases of *traumatic* tetanus, treated with this remedy by Dr. O'Shaughnessy or others, a cure was effected. (See Brit. and For. Med. Rev., July 1840, p. 225.) The vapour of ether or of chloroform. Mercury has been administered in large doses, so as to produce salivation, but it has only served to increase the sufferings of the patient. Depressants, such as bleeding, tartar emetic, tobacco enemata, and the warm and vapour baths; tonics, such as quinine, carbonate of iron, and sulphate of zinc; and stimulants, such as wine, brandy, and ammonia. The cold affusion, a remedy which must be used with great caution. The best mode of applying cold is to place the patient in a warm bath, or to wrap him in hot blankets, and then to pour cold water on the head, at first from a moderate height, and in a stream, and if the patient bears this well, from a greater height and in a fuller stream. The sudden shock has more than once proved fatal. The hand should be kept on the pulse during the operation, and its effect on the circulation should be carefully noted.

TETANUS NEONATORUM—INFANTILE TETANUS.

SYNONYM.—Trismus nascentium.

SYMPTOMS.—In the second or third week after birth, tetanic spasm, beginning in the muscles of the jaw, and thence, in some cases, extending to the whole body, and proving rapidly fatal.

CAUSES.—Improper diet, as in the Westmann Islands, off the coast of Greenland, where the food of children consists almost exclusively of fish; intestinal irritation in hot climates; the impure air of crowded foundling and lying-in hospitals. Intense cold.

TREATMENT.—An aperient should be promptly administered, and the child should be placed in a warm bath. The diet should be restricted either to the mother's milk, or to the milk of the cow. A drachm of castor-oil is a convenient aperient. Free ventilation is an essential part of the treatment.

HYDROPHOBIA—CANINE MADNESS.

SYMPTOMS.—At an uncertain time, ranging from three or four weeks to eighteen months after a bite from a mad animal, pain or uneasiness, or some unusual sensation, often accompanied by inflammation, is felt in the seat of the wound, followed, in many cases, by pains darting from it along the course of the nerves. These local symptoms are not constantly present. After a few hours or days, wandering pains are felt in different parts of the body, the patient complains of stiffness of the neck and throat, and is restless, irritable, and drowsy; his spirits are depressed, he is observed to sigh frequently and deeply, and his sleep is disturbed with frightful dreams.

The true nature of the case is first revealed by an unusual difficulty in swallowing liquids, which becomes more and more strongly marked till it rises to such a pitch, that the moment any fluid is brought near the patient, or when the noise of the fluid is heard pouring out of any vessel, it causes him to start with horror, and the attempt at deglutition is hurried, accompanied with sobbing or deep-catching sighs, and followed by convulsions.

There is a degree of irritability beyond description; the countenance expresses intense anxiety, alarm, and suspicion; the eyebrows are contracted, the eyes wild, staring, and glassy; there is intolerance of light and sound, urgent thirst, a parched tongue, a hot and dry skin, and painful efforts to vomit. The sufferer often screams violently, talks in a loud, important, and authoritative tone, and spits out the viscid saliva between his closed teeth, with loud and noisy strainings, not unlike the barking of a dog. In spite of these severe sufferings, the mind often remains unaffected to the last, but in other cases the patient lapses into wild delirium, talks incessantly and incoherently, and is in a state of the most distressing restlessness; the slightest motion, or sudden change of position, a breath of air, a ray of light, a polished surface, or the slightest noise, will excite a sensation of suffocation and convulsions; delirium in some instances takes place, convulsions now become frequent, and the patient dies convulsed, exhausted, or asphyxiated.

DURATION.—Generally from two to three days. In one case, thirty-six hours; in rare instances, eight or nine days.

LATENT PERIOD.—From three or four weeks to some months, or even years. The most common period from twenty to forty days.

PROGNOSIS.—Fatal. The disease has hitherto defied all remedies.

ANATOMICAL CHARACTERS.—Not constant. Slight traces of inflammation in the spinal marrow and its membranes. Inflammation of the fauces and air-passages, with increased secretion.

RATIONALE.—Intense excitability of the nervous system, with local

inflammation of the fauces acting upon the spinal marrow through the incident nerves, and giving rise to reflex convulsions.

TREATMENT.—*Indications.* I. To prevent the absorption of the poison. II. To remove the irritation of the throat. III. To diminish the excitability of the nervous system.

I. The first indication is fulfilled by the prompt excision of the wound, which should be allowed to bleed freely, and the subsequent application of caustic. If this cannot be done at once, a ligature should in the mean time be applied above the wound, if it be on an extremity, and the virus should be withdrawn by suction.

II. The second indication has never been effectually fulfilled in any other way than by the use of ice taken internally.

III. The third indication may be fulfilled by powerful doses of narcotic remedies. Experience, however, proves that even the largest doses have little or no effect in controlling the patient's sufferings. Chloroform is to be preferred, as most easy of application.

Ice was swallowed with great advantage in a very remarkable case admitted into King's College Hospital, under Dr. Todd. The patient, a boy seven years of age, labouring under hydrophobia in its most marked form, and refusing, with characteristic horror and impatience, everything previously offered him, whether in a liquid or solid form—and who had taken ten drops of dilute hydrocyanic acid, repeated at short intervals, and at length twenty drops in one dose, without apparent effect—after the most severe convulsive paroxysms which had yet seized him, was offered a fragment of rough ice. This he swallowed with avidity. Fresh pieces were constantly put into his mouth, which he seized and crunched between his teeth with remarkable eagerness, and swallowed with the greatest ease. In less than half an hour, he had taken, by a rude estimate, no less than a pound and a-half of rough ice. At the same time that the ice was given internally, a bladder containing a mixture of roughly-powdered ice and common salt was applied to the whole length of the spine and around the throat. Under the external and internal application of cold, all the symptoms of hydrophobia, referable to the throat and chest, with the exception of occasional hawkings, had passed away; the viscid mucus no longer flowed from the mouth, the mucous râle disappeared from the chest, and nothing remained but extreme restlessness, violent excitement, and incoherence. The patient sat up in bed with a large fragment of rough ice in each hand, talking incessantly in a loud voice, addressing a thousand incoherent questions to his mother regarding members of his family, and showing an aimless eagerness. The intense excitement continuing, and all the peculiar symptoms of hydrophobia having subsided, the cold *douche* was, in Dr. Todd's absence, applied by my directions, but the system did not rally from the shock. (See Lancet, January 22, 1842, for a longer report of the case.)

I am inclined to attribute more benefit to the internal than to the

external use of ice in this case, but the joint administration, while the rest of the body is kept warm, seems to be the most rational treatment yet recommended.

DISORDERS OF THE MIND.

MANIA	Furious Madness.
MELANCHOLIA	Melancholy Madnesss.
HYPOCHONDRIASIS . . .	Vapours—Low Spirits.
DELIRIUM TREMENS . .	Drunkard's Delirium.

MANIA—FURIOUS MADNESS.

SYMPTOMS.—This disease sometimes comes on suddenly, but more frequently slowly and almost imperceptibly, being preceded by a period of *incubation*, of variable length, extending from some days or weeks to as many months or years. The symptoms of this period of incubation are an alteration in the thoughts, habits, tastes, temper, and affections, the patient becoming more and more the reverse of his former self. He suffers from a distressing confusion of ideas, a failure of memory, depression of spirits, extreme irritability of temper, a loss of interest in his pursuits, restlessness and sleeplessness, and he has a miserable consciousness of loss of mental power and change of character. The general health suffers; there is pain in the head, and giddiness; the appetite fails, the sleep is disturbed, the bowels are confined, or irregular, or affected with diarrhœa; the tongue is furred, the pulse frequent and quick; the patient grows thin, and the features alter. Frequently before the disease shows itself in its marked form, the bodily health improves, and the painful consciousness of unsoundness of mind disappears.

After these symptoms of the period of incubation have lasted for a longer or shorter period, without forcibly attracting attention, some accident to the head, some unusual excitement, or some circumstance in itself unimportant, brings on a decided attack of mania.

The symptoms of mania, whether beginning suddenly in consequence of strong excitement, or of bodily disease, or coming on slowly after a long period of incubation, are the following:—anxiety, uneasiness, restlessness, sleeplessness, alternate excitement and depression, or continued agitation and violent muscular efforts, rapid incoherent discourse, fits of loud laughter or loud shoutings, grinding of the teeth, spectral illusions, mental delusions, and unfounded antipathy to certain persons, particularly to near relations or intimate friends. There is a peculiar wildness and fierceness of the countenance, the pupil is dilated, the eyelids widely open, the eyes glistening and unsteady, the features strongly marked, and the countenance flushed. The patient will sometimes complain of severe pains in the head, giddiness, loud noises in the ears, and bright spots before the eyes. The sensations are

generally more obtuse than usual, or they are disregarded, so that the patient will bear the most intense cold or heat, prolonged abstinence from food or drink, and long-continued want of sleep. The bowels are usually costive, and require strong aperients; the taste is often depraved, and the appetite variable; the tongue is dry and furred; the pulse increased in frequency, quick, and often full; and the skin often emits a peculiar offensive odour: the habits are careless and negligent, and often filthy. The disease is sometimes complicated with epileptic fits, or with symptoms of paralysis, or with disease of the brain.

Some maniacs have lucid intervals, which recur with regularity; others are subject to paroxysms of very irregular recurrence. They are also capable, under certain circumstances, of considerable self-restraint, and of concealing their delusions or designs, and they will carry out their plans with the cunning of rogues, and the contrivance of sane men.

ANATOMICAL CHARACTERS.—Thickening and loss of transparency in the arachnoid; serum beneath the arachnoid, in the ventricles, or at the base; increased or diminished vascularity of the substance of the cerebrum, softening of the gray matter, especially in cases accompanied by paralysis; increased density of the whole brain, or of parts of it. But there is no morbid appearance proper to insanity.

CAUSES.—*Predisposing.* Hereditary predisposition. *Exciting.*—Violent emotions of the mind; immoderate indulgence of the passions; violent exercise; frequent intoxication; excessive study; suppression of evacuations; long-continued discharges; parturition, lactation, and change of life. Certain diseases of the brain, preceding attacks of epilepsy, and fever.

DIAGNOSIS.—From *encephalitis*, by the absence of febrile symptoms. From *delirium tremens*, by the more violent excitement, the more complete incoherence, the absence of tremor, and the history of the case.

PROGNOSIS.—*Favourable.* The mania following some other disease, or arising from some temporary cause, such as an occasional excitement of the mind or a single indulgence in spirituous liquors; the attacks being slight, and not frequent in their recurrence; youth; hæmorrhage; diarrhœa; scabby eruptions; restored hæmorrhoidal or menstrual discharge. *Unfavourable.*—Coming on after the middle period of life, or having been of long continuance; complication with epileptic fits, or with symptoms of paralysis.

TREATMENT.—During the period of *incubation*, the *medical* treatment must be determined entirely by the condition of the bodily functions. If there are symptoms of determination of blood to the head, they must be met by remedies suitable to that state; if the bowels are habitually confined, aperients must be regularly administered; if the secretions are disordered, the patient must be put under

a course of alteratives; if there is great debility, tonic remedies are indicated; and if the habits of the patient are in any respect unfavourable to health, a change must be insisted upon. The habitual use of the shower-bath, change of air, a nutritious and unstimulating diet, and regular hours for meals and rest, should be particularly enforced. The *moral* treatment will consist in removing as much as possible all causes of excitement, all unnecessary opposition to the patient's plans and wishes, great forbearance on the part of relations and attendants, an entire or partial abstinence from business, change of scene, and cheerful society.

Treatment of the disease when fully formed.—The treatment of this, as of all mental disorders, must be partly *medical* and partly *moral*. *The medical treatment* must be regulated by the existing state of the patient's body, and the ascertained cause of the disease. If the patient is plethoric, or there are decided symptoms of determination of blood to the head, bleeding, cupping, leeching, cold to the head, brisk purgatives, and low diet must be prescribed. If the disease has supervened on suppressed discharges, the same treatment will be necessary. If, however, it has followed suppressed menstrual discharge, and anæmia is present, full doses of steel will be required. If it comes on in the course of another disease, and is in the nature of metastasis, an attempt must be made to re-establish that disease, or active counter-irritation, in imitation of it, must be employed. If, on the contrary, the face is pale, or the attack of mania has been preceded by loss of blood, debilitating discharges, or exhausting diseases, tonics or stimulants, according to the degree of the debility, must be resorted to. In all cases allied to hysteria, the shock of the cold affusion, or the shower-bath, is highly advantageous.

Remedies.—The most approved remedies in the treatment of mania are bleeding, general and local; purgatives; the warm and cold baths; and opium in full doses. Depletion must be used with the precautions just pointed out; purgatives may always be given in the absence of diarrhœa: the warm bath when the skin is cold and the circulation languid; and cold, in its several modes of application, either to reduce inflammation, or, in the form of shock, to rouse the patient to salutary efforts of attention. When there are symptoms of determination of blood to the head, the ice-cap, while the patient is immersed in the warm bath, is highly advantageous. The rotatory swing is another remedy which has been used with advantage in maniacal paroxysms.

When the patient is extremely violent and sleepless, opium may be given with advantage in very large doses, as lately recommended by Dr. Oliver. We may begin with five grains, and increase the dose till it reaches ten, fifteen, or even twenty grains; and as much as half a drachm may be given in the course of the day, and continued for days, or even weeks. This treatment seems to be peculiarly applicable to cases brought on by exhaustion, whether from loss of blood, starvation, intemperance, or dissipation. It would also be indicated in puerperal mania. (See Medical Times and Gazette, August, 1853.)

The moral treatment.—In recent cases of mania, occurring in private houses or in hospitals, it is necessary to prevent the patient from offering violence to himself or others by the strait waistcoat, or the coercion of powerful attendants. In chronic cases, and in lunatic asylums, personal restraint can often be foregone, and constant watchfulness, gentle and conciliating treatment, and occasional seclusion, may be substituted. Much depends upon gaining the confidence of the maniac, and keeping out of sight all irritating means of restraint.

The patient should be engaged in some exercise or pursuit that will employ at once the body and the mind, and thus divert the latter from pursuing one invariable train of thought. He should, therefore, be removed from those objects with which he was formerly acquainted, and out of reach of things and persons associated with the origin of his disease. In cases where there is a tendency to suicide, the most constant watchfulness is required.

Mania is but one of many disorders of the mind, but it is the one which the general practitioner is most likely to be called upon to treat. The other forms of mental unsoundness, viz., idiocy, imbecility, and dementia, fall under the care of those who devote themselves especially to the treatment of the insane.

For a more minute account of many of the phenomena of unsound mind, see Part I. p. 119.

MELANCHOLIA—MELANCHOLY MADNESS.

SYMPTOMS.—This disease is characterised by dejection of spirits, fondness for solitude, timidity, fickleness of temper, and great watchfulness, and is generally accompanied by disorder of the digestive organs, with flatulence and costiveness. The mind pursues one object or train of thought, which in general bears a near relation to the patient himself, or to his affairs, which he views with great and unfounded apprehension, and extreme depression of spirits. This painful state of mind is often attended by a strong propensity to suicide. In one form of the disease the patient refers some bodily sensation to imaginary and impossible causes, as living animals, or even persons in the stomach or bowels.

CAUSES.—*Predisposing.* An hereditary tendency to insanity; the melancholic temperament. *Exciting.*—Long-continued disease of the liver and organs of digestion; suppressed evacuations or cutaneous eruptions; distress of mind; sudden mental shocks; anxiety; excessive evacuations; intemperance.

PROGNOSIS.—*Favourable.* The absence of hereditary predisposition; the previous short duration of the disease; the reappearance of habitual evacuations, or diseases of the skin; sound sleep. *Unfavourable.*—Hereditary predisposition; the melancholic temperament exquisitely formed; the disease being of long standing, or supervening on epilepsy or palsy.

TREATMENT.—The *medical* treatment consists in regulating the functions of the stomach and bowels by aperients and alteratives, and in the use of remedies adapted to the existing state of the patient's constitution. The shower-bath may generally be prescribed with advantage.

The *moral* treatment consists in changing the scene, amusing the mind, and diverting the attention as much as possible from the existing train of thought; travelling, rural sports, society, conversation on favourite topics, and music, may be recommended, according to the tastes of the patient, his previous habits of life, and the experience of his friends or attendants. Patients who betray the slightest tendency to suicide must be closely and constantly watched. When the patient supposes the stomach or bowels to be the seat of some living animal, a pretended operation for its extraction will often effect a cure.

HYPOCHONDRIASIS—VAPOURS—LOW SPIRITS.

SYMPTOMS.—Dyspepsia, with dull pain in the hypochondria; langour, listlessness, want of resolution and activity, disposition to seriousness, sadness, and timidity as to future events. The patient pays particular attention to his health, exaggerates his symptoms, and takes very desponding views of his case.

CAUSES.—*Predisposing.* The melancholic temperament. *Exciting.*—Dyspepsia: painful impressions upon the mind; distressing events.

DIAGNOSIS.—From *melancholia*, by the more constant dyspeptic symptoms, and the absence of well-marked delusions. From *dyspepsia*, by the exaggerated importance attached to existing symptoms.

PROGNOSIS.—The disease is difficult of cure, especially when it is of long continuance.

TREATMENT.—That proper to dyspepsia. Change of air and scene, where they can conveniently be had, should be prescribed; and the patient should be diverted, as much as possible, from the thought of his complaints. Care should be taken not to increase the disease by prescribing active remedies.

DELIRIUM TREMENS—DRUNKARD'S DELIRIUM.

SYMPTOMS.—Sleeplessness; restlessness; strange illusions of the senses of sight and hearing; and delirium, during which the patient recognises those about him, answers questions rationally, and does hurriedly what he is told to do. He talks incessantly, and evinces a great anxiety to be doing something; and will often be found busily looking, in unlikely places, after some object on which his mind is

intent; or he will transact his ordinary business in a dreamy and strange way. He is very suspicious, and fancies that he is surrounded with enemies, or that he is in a strange place, from which he is constantly endeavouring to escape; or he thinks that some great evil is impending, or has actually befallen him. He is rarely violent, at least in the best-marked cases of the disease; but he sometimes exposes himself to danger in endeavouring to effect his escape. Trembling of the lips, hands, and muscles is generally present, and more particularly in speaking, or on making any effort. There is profuse perspiration, a moist and slightly-furred tongue, and a small, quick, frequent, and compressible pulse. The countenance, in the majority of cases, is pale, and the manner of the patient composed and rational, even when describing symptoms and imaginary events calculated to excite and interest persons in their right mind. In fatal cases, the delirium is replaced by coma, the tremor passes into subsultus tendinum, and the evacuations become involuntary; or embarrassed respiration, and mucous râle usher in death by apnœa. The disease is very apt to recur.

The spectral and other illusions of the senses in the subjects of delirium tremens are in some respects peculiar. The patient will be seen listening to the arm of a chair, believing it a serpent, or he will scratch it with his nail, alleging that it is the hiding-place of a scorpion, and he will accuse a bystander of threatening to kill him. Sometimes he confounds inanimate with living objects on account of some single resemblance: thus a groom suffering from delirium tremens will lift up the leg of a table as if it were a horse, and harness chairs with string under the same curious conviction.

POST-MORTEM APPEARANCES.—Effusion of serum in the ventricles, at the base of the brain, under the arachnoid, or in all these situations; injected state of the pia mater. Alcohol has been detected in the serum of the ventricles.

RATIONALE.—A loss of tone in the capillary vessels of the brain, leading to the appearances and results of inflammation, and restored only by resuming the same or a similar stimulus to that by which the altered state of the vessels was originally produced.

CAUSES.—*Predisposing.* Habitual indulgence in spirituous liquors, in opium, or in other poisons belonging to the class of narcotics and sedatives. Mental exhaustion from intense study or prolonged anxiety. The male sex? (this point, for obvious reasons, cannot be accurately determined.) The summer season.

Exciting.—An occasional debauch; continued intemperance; sudden abstinence from an accustomed stimulant; loss of blood; all causes of debility; shock, physical or mental; severe wounds (delirium traumaticum). Diseases occasioning, or ending in, great exhaustion.

DIAGNOSIS.—From *meningitis* by the previous history; by the absence of headache; by the ease with which the patient may be roused; by the moist skin; by the trembling of the hands; by the absence of

febrile and inflammatory symptoms. The distinction between meningitis and a form of delirium tremens coming on after a single debauch, or a comparatively short indulgence in habits of intoxication, is not so easily made, and, in extreme cases, the history of the patient and of the existing attack will be our only guide to treatment. When the respective diseases are well marked, there is no difficulty in the diagnosis.

PROGNOSIS.—*Favourable.* If undue depletion has not been previously practised, and the treatment has not been too long delayed. *Unfavourable.*—Previous treatment tending to occasion exhaustion.

TREATMENT.—*Indication.* I. To procure sleep. II. To reduce inflammation when present.

I. This indication is fulfilled by full doses of opium, laudanum, morphia, or other preparations of opium. Two or three grains of solid opium, or from half a drachm to a drachm of laudanum, followed, at intervals of one, two, or three hours, by a grain of opium, or from twenty drops to half a drachm of laudanum, till sleep is procured, is the appropriate treatment; other preparations of opium, in equivalent doses, may be substituted. The opium may be combined with ammonia, in doses of from five to ten grains (℞. Ammoniæ sesquicarb. gr. x.; Tinct. opii ℥xxx.; Mist. camphoræ ℥i.), with wine, or with the accustomed stimulus of the patient. Chloroform inhalation may be practised when the restlessness is extreme.

II. Inflammatory symptoms are best treated by opium, in combination with full doses of tartar-emetic. Cold to the head and blisters to the neck may also be used, but the abstraction of blood should be avoided, unless the countenance is flushed, the eye injected, and the pulse hard and incompressible. Blood-letting is contraindicated in all other cases; and it is very rarely admissible except when the disease is due to a single debauch. The bowels should be kept moderately open, but strong purgatives should be avoided.

The patient should be watched, but if not extremely violent, ought not to be confined by the strait waistcoat. One or two strong persons should be at hand for security's sake.

REMEDIES.—Calomel and opium. The calomel is contraindicated. Opium and tartar-emetic; indicated when inflammatory symptoms are present. Digitalis; a remedy of very doubtful efficacy.

CHAPTER II.

DISEASES OF THE CIRCULATING SYSTEM.

1. Of the Heart.
2. Of the Arteries.
3. Of the Veins.

DISEASES OF THE HEART.

1. Functional or Nervous Affections.
2. Structural or Organic Diseases.

1. FUNCTIONAL OR NERVOUS AFFECTIONS.

PALPITATIO . . . . . Palpitation.
SYNCOPE . . . . . Fainting (see p. 281).
ANGINA PECTORIS . . . Spasm of the Heart.
NEURALGIA CORDIS . . . Pain in the Heart.

PALPITATIO—PALPITATION.

THE term *palpitation*, or *nervous palpitation*, is given to frequent, strong, and tumultuous movements of the heart, without appreciable organic lesion. When existing in an extreme degree, the beats of the heart are both heard and felt by the patient, and seen by the bystander; and are sometimes accompanied by a slight and transient *bruit de soufflet*, which disappears when the heart becomes quiet. The palpitation is attended by a painful sensation of sinking, referred to the region of the heart or pit of the stomach, and spoken of as "a sinking at the heart." In some cases there is a tendency to syncope.

CAUSES.—*Predisposing.* The nervous temperament; the female sex.

Exciting.—Strong mental emotions—joy, grief, anger, sadness, fear, anxiety—violent exercise. Debility caused by chronic disease, or occurring during convalescence from fevers or other acute diseases; excessive loss of blood; inordinate natural discharges; abuse of purgatives; want of nourishment; intemperance; want of sleep; continued anxiety and distress; close confinement; intense study; dissipation and debauchery; excessive sexual intercourse; onanism. In females, change of life.

The diseases most frequently accompanied by palpitation are, anæmia, hysteria, spinal irritation, and mimosis inquieta, in females; spermatorrhœa, in males; and plethora, dyspepsia, diseases causing great embarrassment in the breathing, and pulmonary consumption in both sexes.

Long before any other symptom of pulmonary consumption has made its appearance, the patient will often complain of distressing palpitation; and this is so common, that palpitation, not otherwise readily accounted for, should lead to an examination of the lungs.

Chlorotic girls are often supposed to labour under organic disease of the heart, when there is only functional or nervous disturbance of the organ. They complain of palpitations, difficulty of breathing, and pain in the left side, and are sometimes bled, leeched, cupped, and blistered when they require an opposite treatment. In females who suffer from spinal irritation, the heart is often very irritable, and the pulse may exceed 160 in the minute. In these cases, too, the abstraction of blood is often prescribed where it is unnecessary and injurious.

DIAGNOSIS.—The condition of the general health; the absence of the physical signs of organic disease; the peculiarly distinct character of the sounds of the heart; the absence of inequality and irregularity of the pulse (except in rare cases of dyspepsia); the entire freedom enjoyed at intervals; the great frequency of the pulse when the finger is first placed upon it, and the gradual diminution which follows as the patient's apprehension disappears. The diagnosis is, however, not free from difficulty, and may, in some cases, require repeated examination before a decision can be formed. That this difficulty is often experienced, will appear from the observation of Dr. Baillie: "There are, in truth, few phenomena which puzzle, perplex, and lead into error the inexperienced (and sometimes the experienced) practitioner, so much as inordinate action of the heart. He sees, or thinks he sees, some terrible cause for this tumult in the central organ of the circulation, and frames his portentous diagnosis and prognosis accordingly. In the pride of his penetration, he renders miserable for a time the friends, and by his direful countenance damps the spirits of his patient. But ultimate recovery *not seldom* disappoints his fears, and the physician is mortified at his own success."

TREATMENT.—In plethoric individuals, the abstraction of blood from the arm, or by leeching or cupping to the region of the heart, followed by saline aperients, low diet, and rest, and by medicines containing digitalis, or hydrocyanic acid. An anodyne plaster over the region of the heart, consisting of extract of belladonna, or the emp. saponis c. opio. In delicate, nervous, and chlorotic persons, tonics, chalybeates, cold or shower baths, change of air, a nourishing diet, improvement of the digestion and general health, with moderate exercise. In such persons blood-letting is injurious, and often productive of the worst consequences.

Palpitation in weak and nervous persons of both sexes, not being

plethoric or anæmic, is best treated by tonics and sedatives in combination. (See Mimosis Inquieta, p. 288.)

In persons subject to nervous palpitations, it is of the first importance to procure tranquillity of mind; and as the fear of organic disease of the heart is often present, the assurance of the medical man that the heart is free from structural disease will go far to effect a cure.

Irregular and intermittent pulsations of the heart often arise from the causes which produce nervous palpitations, especially from dyspepsia attended with flatulence, and are relieved by the same remedies. But they may depend on organic diseases of the heart. The pulse at the wrist and heart may be irregular and intermittent during health, become regular during acute disease, and return to its former condition during convalescence or recovery.

Pulsation in the epigastrium, like palpitation, is dependent upon various causes, and, like it, occurs in paroxysms, and in dyspeptic persons. Sometimes the pulsation is communicated to an intestine distended with gas or fæces, and in this case it is apt to simulate aneurism. It is frequently removed by a brisk purgative, or by a course of aperient medicines.

ANGINA PECTORIS—SPASM OF THE HEART.

SYNONYM.—Syncope anginosa.

DEFINITION.—Sudden and acute pain in the chest, referred to the sternum, accompanied by intense anxiety and fear of death.

SYMPTOMS. — During exercise, especially when walking up an ascent against the wind, or after a full meal, a sudden and violent pain across the chest, extending down the arms as far as the insertion of the deltoid muscles, and, in some cases, to the wrists, or fingers, accompanied with a sense of stricture so acute as to threaten immediate destruction. The patient is instantly obliged to stand still, and the moment he does so all the symptoms vanish. After repeated attacks of the disease, it is excited by slighter causes, and the paroxysms are more violent and of longer duration. It often occurs on the patient's waking from his first sleep, and he is, at times, incapable of lying down. At length, a fit more violent than usual puts an end to his existence.

MORBID APPEARANCES.—Ossification of the coronary arteries; ossification of the valves of the heart; morbid accumulation of fat; atrophy of the heart, from fatty degeneration. In a few cases, the disease is unexplained by any morbid appearance.

CAUSES.—*Predisposing.* The male sex; advanced age. The great majority of cases occur in men after fifty years of age, but it may occur as early as thirty-five.

Exciting.—Violent exercise, strong mental emotion, and excess of all kinds: flatulence.

TREATMENT.—*Indications.* I. In the paroxysm, to alleviate the symptoms. II. In the interval, to prevent their return.

I. The symptoms are sometimes relieved—

a. By bleeding. This remedy, however, ought to be used with great caution, and only when the pulse, during the fit, is full and hard. The patient should be placed in the recumbent position, and a small quantity only of blood be drawn away. The treatment during the paroxysms must, however, depend upon the cause of the disease. When there is disease of the valves of the heart, the cautious abstraction of blood will often be indicated, and give great relief. If there is reason to apprehend atrophy of the heart, or softening of the muscular structure, bleeding is contraindicated, and the stimulant plan is to be preferred.

b. By cordials, stimulants, and antispasmodics, such as æther, laudanum, ammonia, brandy and water, and strong coffee. The patient should always have at hand some diffusible stimulus, or combination of a diffusible stimulus with an opiate, such as experience has shown to be beneficial. (℞. Spt. æther. c. f℥iss. Liq. opii sedativ. f℥ss. A small tea-spoonful, in a wine-glass of water, to be taken on each occurrence of a fit.)

II. The return of the paroxysm is to be prevented—

a. By abstemious living.

b. By avoiding strong exercise, and walking up hill, especially against the wind. Occasions of irritation or annoyance should also be avoided.

c. By remedies adapted to the existing state of the general health and existing local affections. The belladonna or soap and opium plaster may be worn on the left side with advantage.

REMEDIES.—Issues; setons; blisters to the chest. These are of doubtful advantage.

NEURALGIA CORDIS—PAIN IN THE HEART.

SYMPTOMS.—This disease differs from angina pectoris in consisting of a darting pain in the region of the heart, without any affection of the respiration: and, in most cases, without any alteration in the heart's beat. It is purely nervous, and probably dependent upon dyspepsia, combined with flatulence. It has been attributed in some cases, and with apparent reason, to excessive indulgence in strong tea.

DIAGNOSIS.—From *organic diseases*, by the absence of the stethoscopic signs. From *angina pectoris*, by the slight disturbance of the circulation, by the absence of the peculiar suffering of angina, and of the pain in the arms.

TREATMENT.—This must depend on the state of the patient's health, and the ascertained cause of the individual paroxysms. Benefit is often derived from the application of a belladonna plaster to

the region of the heart. It is probable that certain cases of nervous asthma, and the less severe forms of angina pectoris, are simply neuralgic affections; and these are generally relieved by powerful sedatives and antispasmodics.

Spasm of the Heart is described by Laennec, though considered an imaginary disorder by Bouillaud, who states that there is no positive fact to attest its existence. But there is no reason why the heart should not suffer from spasm as well as other muscular organs.

The muscular structure of the heart would also seem to be the occasional seat of rheumatism; the symptoms being constant dull pain, increased at intervals, and palpitation, without any abnormal sound. In such cases, colchicum is indicated.

STRUCTURAL DISEASES OF THE HEART.

PERICARDITIS . . Inflammation of the Pericardium.
ENDOCARDITIS . . Inflammation of the Endocardium.
DISEASES OF THE VALVES OF THE HEART.
CARDITIS . . . . Inflammation of the Substance of the Heart.
HYPERTROPHY . . Of the Heart.
ATROPHY. . . . Of the Heart.
DILATATION . . . Of the Heart.
CYANOSIS . . . Blue Disease.

PERICARDITIS—INFLAMMATION OF THE PERICARDIUM.

SPECIES.—I. Acute; 2. Chronic.

1. ACUTE PERICARDITIS.

Idiopathic pericarditis is of very rare occurrence. The disease is commonly an accompaniment of acute rheumatism.

SYMPTOMS.—After rigors, which are sometimes extremely severe, pain, more or less acute, under the left nipple and towards the inferior extremity of the sternum, occupying a part or the whole of the præcordial region, radiating towards the left axilla and arm, and sometimes extending down the left arm to the elbow or wrist. The pain may be pungent and lancinating, or dull and obscure; or there is merely a feeling of oppression. When pain is present, it is increased, when absent, often produced, by deep pressure in the intercostal spaces over the region of the heart, by upward pressure against the diaphragm, or by an attempt to lie on either side. There are also violent and often irregular palpitations either visible, or perceived only on placing the hand over the heart.

In addition to these symptoms, referable to the heart itself, there

is more or less fever; a frequent, full, hard, regular, and *jarring* pulse, or a small, unequal, irregular, and very rapid one; dyspnœa, or respiration interrupted by sighs, sobs, or hiccough; an insupportable sense of oppression, restlessness, jactitation, and an urgent want of fresh air; the skin is often bathed in sweat, or it is very dry and hot; the countenance is pale, sharpened, and expressive of extreme anxiety and terror. Sometimes there are attacks of partial or general convulsions, or a slight and momentary delirium, and if the patient sleep, he awakes with fearful dreams; in other cases, there is complete insomnolence. The anxiety and agony are sometimes so insupportable that the slightest motion occasions an apprehension of sudden death. When the disease proves fatal, all the symptoms increase in severity, the breathing becomes more and more laborious, the countenance is livid, the eye glassy, the skin covered with a clammy sweat, and the patient expires amidst dreadful sufferings.

Rheumatismal pericarditis is often indolent and attended with little pain, unless when complicated with pleurisy, especially with pleurisy of the left side, or of the left portion of the diaphragmatic pleura.

TERMINATIONS.—1. In complete recovery. 2. In chronic pericarditis. 3. In death.

ANATOMICAL CHARACTERS.—Effusion of serum, mixed with shreds of coagulable lymph, or with pus, and sometimes tinged with blood; rough deposits of lymph on the surface of the membrane; slight and soft adhesions between the two surfaces. Within the heart, some of the appearances proper to acute endocarditis.

DIAGNOSIS.—Difficult in certain cases, and apt to be confounded with pleuritis, pneumonia, or even with simple fever. When the symptoms are strongly marked, it is difficult to confound it with any other disease, especially when the *physical* signs are taken into account.

Auscultation.—Within a few hours, or one or two days of the commencement of the disease, a superficial *to-and-fro* sound (*bruit de frottement*), corresponding to the two sounds of the heart, and resembling the sound caused by rubbing the two hands backwards and forwards against each other, or when the secretion of lymph is more consistent, closely resembling the sound of new leather (*bruit de cuir*), or in still more marked cases, the sound of a file or rasp (*bruit de scie, bruit de râpe*). As the secretion into the sac of the pericardium increases, or if the opposite surfaces become adherent, the *to-and-fro* sound disappears. This superficial *to-and-fro* sound is often accompanied by a bellows sound synchronous with the systole of the heart, and this sound often remains when the *to-and-fro* sound has ceased. The *to-and-fro* sound is first heard a little to the left of the mesial line, and about the centre of the sternum, whence it gradually extends to the entire surface of the heart. *Percussion* detects extensive dulness, when the effusion is considerable.

PROGNOSIS.—Complete recovery is very rare, if it ever occur.

Some roughness of the pericardium, or adhesion of the opposed surfaces, or effusion into the sac of the pericardium, is left behind, or some of the diseased states induced by the accompanying endocarditis.

CAUSES.—*Predisposing.* Hereditary tendency to rheumatic and gouty affections; male sex; age from 10 to 30.

Exciting.—Cold, and, in the large majority of cases, the extension or metastasis of acute articular rheumatism.

TREATMENT.—*Indications.* I. To subdue the existing inflammation. II. To promote the absorption of effused matters.

I. The first indication is fulfilled by general or local bleeding, according to the strength and state of the patient. If the disease comes on suddenly in a vigorous plethoric person, blood may be taken from the arm, so as to make a decided impression on the pulse; and this may be followed by cupping or leeches over the region of the heart. But if the disease supervenes, as it generally does, in the course of an attack of acute rheumatism, or in one whose health is already below par, topical bleeding by cupping or leeches will suffice. In no case should depleting measures be carried to excess. This part of the treatment may be assisted by purgatives, rest, and the antiphlogistic regimen; and when depletion has been carried to the proper extent, a blister may be applied over the region of the heart, and kept open for a time by the savin ointment.

II. The second indication is fulfilled by mercury freely given every one, two, or three hours, in combination with opium, and accompanied by mercurial inunction, till the gums are sore. In very acute forms of idiopathic pericarditis, the mercury may be combined with tartar emetic in doses of $\frac{1}{6}$ to $\frac{1}{4}$ of a grain; and in rheumatic pericarditis, with the extract of colchicum in doses of one, two, or three grains.

2. CHRONIC PERICARDITIS.

SYMPTOMS.—Palpitation and dyspnœa, accompanied sometimes with dry cough; inability to lie on the left side; slight pain or uneasiness in the region of the heart; low fever, with or without evening exacerbation; sense of oppression; great debility; and slow and imperfect convalescence, or a fatal termination in hydropericardium.

CAUSES.—Chronic pericarditis is generally a sequela of the acute form of the disease; but in debilitated constitutions, or when it comes on in the course of an attack of acute rheumatism, the symptoms are from the first much less severe, and sometimes very obscure.

TREATMENT.—Local depletion by cupping and leeches; blisters to the region of the heart; calomel and opium; or, where the disease is the consequence of rheumatism, colchicum, combined, if there is much debility, with ammonia. The convalescence should be carefully watched, violent exercise should be avoided, and a nourishing, unstimulating diet should be prescribed.

SEQUELÆ.—Important structural changes often remain when the

symptoms of pericarditis, whether acute or chronic, have been removed. The pericardium may be thickened, and the subjacent capillary vessels enlarged. There may be serum, or lymph, or pus in the pericardium, adhesions, partial or general, and organised deposits of fibrin, in the form of granulations and vegetations. The false membranes may also become fibro-cartilaginous, or even osseous. The effused fluid, or the thick false membranes, sometimes compress the heart so as to occasion atrophy. The internal sero-fibrous tissue of the heart sometimes presents the same alterations as the external covering (see Endocarditis). The muscular tissue of the heart may, like the serous, fibrous, and cellular tissue of the same organ, become thickened, and hypertrophied, indurated or softened, by the extension of the inflammation from the pericardium (see Carditis).

These changes may be detected by careful stethoscopic examination. The superficial *to-and-fro* sound synchronous with both sounds of the heart (see Acute Pericarditis), is generally characteristic of recent effusion, and disappears as the sac of the pleura becomes distended, or when adhesions are formed. The denser deposits on the surface of the pericardium are indicated by harsher and louder sounds, corresponding to the apex or base of the heart. Partial adhesions of the two layers of the pericardium are sometimes productive of no unusual sounds; at others, of some modification of the friction sounds. Extensive adhesions of the two layers of the pericardium generally lead to irregular action of the organ, and are accompanied by a well-marked retraction of the epigastrium, and hollowing of the intercostal spaces with each systole of the heart; and the heart's beat continues to be perceptible in the same spot, in all positions of the body, and in all states of the respiration. For the physical signs of extensive effusion in the sac of the pericardium, see Hydropericardium.

ENDOCARDITIS—INFLAMMATION OF THE ENDOCARDIUM.

Symptoms.—General feeling of uneasiness, anxiety, and oppression at the præcordia with a tendency to syncope; but no pain, unless the disease is complicated with pericarditis or pleurisy. In the more severe cases there is well-marked fever, hot and dry skin, thirst, and restlessness; violent and irregular action of the heart, with a small, feeble, and often intermitting pulse; extreme anxiety; jactitation; cold sweats; pale and shrunken features, expressive of extreme alarm; dyspnœa, faintness, or actual syncope; lividity of the lips and cheeks; slight swelling of the hands and feet; and short convulsive or epileptic seizures.

Anatomical Characters.—1. Redness of the endocardium, sometimes general, but more frequently partial; often confined to the valves alone, and generally accompanied by some thickening, infil-

tion, and softening of the membrane. 2. Effusion of coagulable lymph, in the form of white, elastic, glutinous masses, firmly attached to the free borders of the valves, adherent to the parietes of the heart, and entwined round the valvular tendons and fleshy columns, and often prolonged into the large vessels. 3. Vegetations or granulations, varying in size from that of a millet-seed to that of a small pea, single or clustered, round, cylindrical, or flattened, their surfaces smooth or rough, and when very numerous resembling the head of a cauliflower, are situated on the free borders of the valves, and sometimes on the internal surface of the cavities, and especially of the auricles. 4. These vegetations are often accompanied by fibro-cartilaginous or calcareous indurations of the valves, which contract the orifices of the heart so as to impede the circulation of the blood, and lay the foundations of other severe diseases of the organ. Sometimes the opposite borders of the valves are adherent.

CAUSES.—Those of pericarditis, which it often accompanies.

DIAGNOSIS.—The stethoscopic indications mentioned under diseases of the valves of the heart.

PROGNOSIS.—The disease is rarely fatal in its acute stage; but it generally leaves behind it valvular disease, which lays the foundation of hypertrophy, and increasing impediment to the circulation, ending either in sudden death or in dropsical effusions. The duration of the disease is very various, and much influenced by the habits of the patient. It may continue for years, leading to a slowly-increasing embarrassment of the circulation.

TREATMENT.—That of pericarditis. In the acute form, and in vigorous subjects, active and prompt treatment is still more necessary than in pericarditis.

When endocarditis becomes chronic without organic disease, the symptoms may be alleviated by small and repeated bleedings, cupping, or leeching; gentle aperients; counter-irritants; the warm bath; repose; and a strictly-regulated diet. Issues and setons over the region of the heart may also be used with advantage.

DISEASES OF THE VALVES OF THE HEART.

SYMPTOMS.—The symptoms attendant on diseases of the valves of the heart are by no means uniform; but they vary with the particular valve which is the seat of the disease, and with the nature, extent, and duration of the morbid change itself. This change, by the impediment which it offers to the circulation of the blood, leads to alterations in the size of the cavities, and in the strength of the parietes, of the heart; and the altered condition of the circulation through the heart itself is soon followed by serious changes in the general circulation through the body, by secondary diseases of the important viscera of the chest, head, and abdomen, and by dropsical effusions.

The symptoms of valvular disease, therefore, are partly common to all diseases of the heart, and partly peculiar to itself. The more common symptoms are palpitation, a tumultuous beat of the heart, a frequent pulse, a sense of weight, tightness, and oppression, sometimes accompanied by pain, in the region of the heart and at the epigastrium; dyspnœa; an inability to lie on one or other of the sides, and sometimes on both; flatulency; frequent feelings of faintness and giddiness, or fits of syncope; an anxious expression of countenance, with slight knitting of the brows; the countenance sometimes pale, sometimes suffused. These symptoms are greatly increased by active exertion, walking up hill, or mounting the stairs, and by violent mental emotions.

These alterations in the structure of the heart affect the more important functions of the body as follows:—

Arterial and venous circulation.—Notwithstanding the irregular, unequal, intermittent, and violent beatings of the heart, the pulse is generally small, and often compressible; but in other cases it is hard and vibrating, more especially when the left ventricle is hypertrophied, or when the aorta is the seat of the disease.

When the orifices of the right side of the heart are contracted and the valves indurated, or when the right auriculo-ventricular valve admits of regurgitation, the venous circulation is sensibly affected; the jugular veins are distended, and sometimes pulsate synchronously with the pulse; and, in some cases, the veins on the sides of the neck and above the clavicles become varicose and greatly enlarged, and the anastomising veins on the parietes of the chest and abdomen, which are scarcely perceptible in the normal state, become augmented in size.

The obstacle thus offered to the return of the venous blood gives rise to lividity of the face, lips, and hands, and congestion of the lungs, liver, brain, mucous, cellular, and serous membranes; followed, in some cases, by serous effusions, such as ascites, hydrothorax, anasarca, and to passive hæmorrhages. Other diseases of the internal organs are often caused by obstruction to the passage of the venous blood through the right cavities of the heart; and the same mechanical cause often predisposes to apoplexy and paralysis.

The respiration.—Slight dyspnœa, or shortness of breath, increased by exertion or mental emotion, is the first derangement of the respiration; but as the disease advances, this symptom often becomes so urgent, that the patient cannot breathe unless sitting up in bed (orthopnœa), and dreads suffocation on lying down. A cough with mucous expectoration is a frequent, and hæmoptysis an occasional, concomitant.

The cerebral functions.—The countenance is expressive of marked anxiety. The patient, though drowsy, sleeps little, and his slumbers are disturbed by frightful dreams, from which he awakes with increased difficulty of breathing, and an aggravation of all his sufferings. In fatal cases, death is often preceded by delirium, and ends in coma.

When one or more of the symptoms just detailed are present, our

attention should be directed to the heart, and a careful stethoscopic examination should be made. There are also certain characters of the pulse which are alone sufficient to rouse the attention, such as an unusual frequency, accompanied by a peculiar jarring or thrilling stroke; or any inequality, irregularity, or intermission of the beats.

PHYSICAL SIGNS.—The attention having been directed to the heart as the seat of disease by any of the foregoing symptoms, the precise nature and seat of the disease may often be discovered by the use of the stethoscope. (See Part I., p. 189, and *seq.*)

TREATMENT.—The *treatment* of valvular disease of the heart will consist in the occasional and cautious abstraction of blood by a small orifice, great moderation in diet, and an abstinence from all violent exertions of the body, and from strong mental emotions. In the more advanced stages of the disease the treatment must be determined by the existing complications. The general principle of the treatment will be to avoid all excitement of the circulation, and the use of remedies which impair the power of the heart; at the same time relieving any unusual embarrassment of the circulation by moderate depletion. Undue action of the heart may be moderated by the internal use of digitalis, and the external application of the emplast. belladonnæ, or emplast. saponis c. opio.

DIAGNOSIS OF DISEASE OF THE SEVERAL VALVES AND ORIFICES OF THE HEART.

On this subject the following general principles may be laid down:—1. The left side of the heart is much more frequently affected than the right. 2. When the right side of the heart is the seat of disease, the left side is generally affected at the same time. 3. Diseases of the right side chiefly affect the venous circulation, causing regurgitation into the jugular veins, known as the venous pulse. 4. Diseases of the left side affect chiefly the arterial pulse, giving rise to irregularity and inequality. 5. Disease of the right side of the heart generally leads to dropsical effusions; disease of the left side to affections of the lungs; and disease of the aorta to head symptoms. 6. Sounds, whether on the right or left side, which accompany or take the place of the first sound of the heart, or the systole of the ventricles, and are synchronous with the pulse, are due to the passage of the blood out of a ventricle—that is to say, to regurgitation into the corresponding auricle, or onward movement into the corresponding artery. 7. Sounds, whether on the right or left side, which accompany or take the place of the second sound of the heart, or the diastole of the ventricle, and are not synchronous with the pulse, are due to the entrance of blood into the ventricles, in consequence of the contraction of the corresponding auricles, or to regurgitation from the corresponding arteries. 8. Sounds which are heard at the base of the heart and in the course of the aorta towards the right clavicle, becoming less audible towards the apex of the heart, indicate disease of the valves of

coats of the aorta. If the sound accompanies the contraction of the ventricle, and is synchronous with a regular, equal, *thrilling* pulse, it is due to disease of the valves or coats of the aorta; but if the sound accompanies the diastole of the ventricle, is not synchronous with the pulse, the pulse, at the same time, being abrupt and *jerking*, and the abrupt second sound of the heart being absent or very obscure, the sound is due to reflux through the open valves of the aorta. 9. If, on the other hand, the sound is synchronous with the systole of the ventricle, and with the pulse, the pulse, at the same time, being unequal and irregular, the sound is due to the reflux of the blood from the left ventricle, through a diseased mitral valve, into the left auricle; but if the sound is not synchronous with the contraction of the ventricle, it is due to the passage of the blood from the auricle to the ventricle, through a diseased mitral valve. 10. The same rules apply to the right side of the heart, which, however, is rarely the seat of disease. If the disease were in the pulmonary artery, the sound would be heard in the track of that vessel, towards the left clavicle.

For additional information on this subject, see Part I., p. 191.

CARDITIS.

SYMPTOMS.—Carditis, or inflammation of the substance of the heart, rarely occurs as a distinct affection, and the post-mortem appearances which characterise it have generally been found combined with pericarditis, or endocarditis, or both. This, however, does not prove that the muscular tissue of the heart may not be separately affected, for it may be diseased, and yet the disease may not necessarily prove fatal. If articular rheumatism affecting the fibrous tissues of the joints may attack the fibrous tissues of the heart, there is the strongest reason from analogy to believe that muscular rheumatism, attacking the muscular fibre alone, or the cellular tissue by which it is enveloped, may affect the heart in common with other muscles.

Such a disease would probably be characterised by simple palpitation, with strong and abrupt contractions of the organ, a very frequent, full, and bounding pulse, and a dull heavy sensation in the region of the heart, with paroxysms of severe darting or shooting pain in the heart itself, extending to the shoulders and down to the arms; with some degree of dyspnœa. These symptoms would accompany or follow muscular rheumatism in other parts of the body.

I have known such symptoms supervene on a severe attack of muscular rheumatism, without any indication of inflammation in the pericardium or endocardium. The treatment would be that of muscular rheumatism, with counter-irritation to the region of the heart, and, in the most severe cases, general or local depletion. (G.)

The existence of inflammation of the structure of the heart itself is proved by several recorded cases of softening, suppuration, ulceration, and perforation of the cardiac parietes. The symptoms during life are not sufficiently characteristic to admit of precise description.

HYPERTROPHY OF THE HEART.

SPECIES.—1. Simple hypertrophy. 2. Hypertrophy with dilatation (eccentric). 3. Hypertrophy with contraction (concentric).

SYMPTOMS.—Palpitation; a strong, regular, and frequent pulse (small in hypertrophy with contraction, full in hypertrophy with dilatation); dyspnœa, increased on exertion; headache, and giddiness. In the early stage, the patient may have every appearance of good health; but when the disease is more advanced, the above symptoms increase in severity, œdema supervenes, usually beginning in the face, and gradually extending to other parts of the body; and active hæmorrhage takes place from the nose or from the hæmorrhoidal vessels. There is often the most profuse sweating. In the end, the hypertrophy is complicated with disease of other important viscera, which is the immediate cause of death.

PHYSICAL SIGNS.—Impulse of the heart greatly increased in force, prolonged and extending over a large space, visible to the eye, and strongly raising the hand of the observer; the first sound of the heart obscure, when there is little or no dilatation; louder, more abrupt, and heard over a larger space when the dilatation is considerable; the second sound obscure in the former case, unusually distinct in the latter. The more violent palpitations are attended with the bellows sound, which disappears with repose. On percussion, there is dulness, varying with the degree of enlargement, and most extensive where dilatation is combined with hypertrophy. In some instances there is prominence and increased breadth of the left side of the chest. When the right side of the heart is affected, the dulness on percussion is most marked behind the lower part of the sternum, the venous pulse is strongly marked, and the organs of respiration suffer, while the arterial pulse undergoes but little change. In hypertrophy, with dilatation of the left side of the heart, the symptoms and complications are those of the cerebral and general circulation—viz., active hæmorrhages and acute inflammations. When the hypertrophy affects both sides of the heart, venous congestion and lung symptoms are combined with those affecting the cerebral and general circulation.

Complications and secondary affections.—Valvular disease, generally the cause, but sometimes the consequence, of hypertrophy. Aneurism, hæmorrhage, dropsy, inflammatory diseases, visceral enlargement, especially fatty degeneration of the liver and kidneys, emphysema, bronchitis, cerebral and pulmonary apoplexy.

CAUSES.—Violent exertion, prolonged muscular efforts, as in gymnastic exercises, strong mental emotions, plethora, obstructions in the large vessels or in the heart itself, long-continued palpitations, pericarditis and endo-carditis; chronic diseases of the lungs, especially emphysema.

PROGNOSIS.—The disease may continue for many years, and gene-

rally proves fatal in consequence of some of the secondary affections mentioned above.

TREATMENT.—Perfect quiet of body and mind, a spare diet, gentle aperients, the occasional cautious abstraction of blood from the arm, or from the region of the heart by cupping. A combination of opium and digitalis in small doses (five drops of laudanum with five or ten drops of tincture of digitalis, given two or three times a-day), and the external application of the emplastrum belladonnæ.

REMEDIES.—Hydrocyanic acid; opium or digitalis, applied externally to a blistered surface; counter-irritants. Mercury.

ATROPHY OF THE HEART.

SYMPTOMS.—Occasional fainting fits, and transient attacks of giddiness, in some cases, and the symptoms of angina pectoris in others. The most common termination of the disease is in sudden death under change of posture or slight exertion, the patient having previously suffered from debility, with great pallor of countenance and anasarca; but in some instances the patient is stout and apparently healthy. The respiration is sometimes affected in the manner described at p. 209. The pulsations of the heart are small and feeble, the impulse much weaker than natural, and scarcely felt by the hand, and the sounds indistinct. The pulse is very compressible, small in atrophy without dilatation, and full in atrophy with dilatation, and commonly below the natural frequency.

CAUSES.—*Predisposing.* The male sex; age about 50; habits of intemperance; exhausting diseases, such as hæmorrhage, typhus fever, pulmonary consumption, emphysema of long standing, and dropsy.

Proximate.—Compression of the heart by deposits of fat, by effusion of fluid, by tumours, or by any other mechanical cause; fatty degeneration of the muscular tissue of the heart itself, embracing the whole heart or one or other of the ventricles, more commonly the right; contraction of the coronary arteries.

MORBID ANATOMY.—Fatty degeneration of the liver and kidneys, and of the aorta, emphysema of the lungs, and ulceration of the stomach, are common concomitants. For the microscopic appearances characterising fatty degeneration with atrophy of the muscular structure, see wood-cut, Part I., p. 94.

TREATMENT.—Nutritious diet, with tonics (among which steel is to be preferred) or stimulants, according to the degree of the existing debility. Great watchfulness on the part of the attendants, if the disease is suspected during life. The disease itself does not admit of cure.

DILATATION OF THE HEART.

SPECIES.—Dilatation with hypertrophy (*active*), dilatation with thinness of the parietes (*passive*).

For the symptoms of dilatation with hypertrophy, see Hypertrophy of the Heart.

SYMPTOMS *of dilatation with thinness of the parietes.*—This is most common on the right side. It is characterised by a fluttering of the heart; a full, frequent, weak, and irregular pulse; swelling of the veins of the neck, and distinct venous pulse; great dyspnœa; a dusky skin; a bloated and anxious countenance; drowsiness; slight delirium; dropsical effusions.

PHYSICAL SIGNS.—Feeble impulse, felt, however, over a greater extent than usual; first sound short and peculiarly distinct, heard over a great extent of the chest both before and behind. In dilatation with hypertrophy, strong impulse with clear sound.

CAUSES.—Obstruction to the pulmonary circulation, pulmonary emphysema, long-standing diseases of the lungs, valvular diseases of the left side of the heart.

PROGNOSIS.—Unfavourable, but in the absence of severe complications, of dropsical effusions, or of great debility, the patient may survive for a considerable period.

TREATMENT.—Repose of body and mind, careful regulation of the diet, aperient medicines. Gentle opiates or sedatives may occasionally be of service to allay irritability. If the circulation be greatly embarrassed, small bleedings by cupping or leeches may be had recourse to. For the treatment of hypertrophy with dilatation, see Hypertrophy.

Partial dilatation, or *true aneurism* of the heart, consists in a protrusion of some portion of the parietes of the heart, in consequence of ulceration of the muscular tissue, and is an equally rare, obscure, and fatal disease. Its general symptoms differ little from those of more general dilatation of the cavities of the heart, and the physical signs are equally obscure; the prognosis of the disease, when recognised, is in the highest degree unfavourable, and the treatment similar to that for more general dilatation—complete repose of body and mind, the cautious use of narcotic and sedative remedies, and in cases of extreme urgency, cautious local depletion.

CYANOSIS—BLUE DISEASE.

SYMPTOMS.—A blue colour of the skin, lips, and lining membrane of the mouth; universal coldness of the surface; palpitation: fits of extreme dyspnœa, sometimes almost amounting to asphyxia; faintness

or actual syncope, on slight exertion, or from mental excitement; feeble and irregular pulse; œdema or dropsical effusions.

ANATOMICAL CHARACTERS.—A communication between the two sides of the heart, or between the two sets of vessels arising from it, with disproportionate strength of the two ventricles, generally combined with narrowing of the pulmonary artery. Extreme contraction of the pulmonary artery alone.

PHYSICAL SIGNS.—A very loud and superficial murmur immediately over the seat of the communication.

PROGNOSIS.—Death during a paroxysm at an early age; in rare instances the patient attains the adult age; and in one case recorded by Louis, the age of fifty-seven.

TREATMENT.—Rest of mind and body; pure air; warm clothing; strict diet; careful attention to the state of the stomach and bowels; and cautious treatment of complications.

DISEASES OF THE PERICARDIUM.

HYDRO-PERICARDIUM . . Dropsy of the heart.

HYDRO-PERICARDIUM.

SPECIES.—1. Active, from inflammatory action in the pericardium. 2. Passive, from obstruction to the circulation.

SYMPTOMS.—In *active* dropsy, the result of inflammatory action, the symptoms of pericarditis are, or have been, present. (See Pericarditis.)

The symptoms of the *passive* form are generally obscure. They are, a sense of weight and oppression in the præcordia, great difficulty of breathing, a dusky, suffused countenance, a tendency to syncope, œdema, and a small, frequent, irregular pulse. The patient usually sits up in bed, and is afraid of the least exertion, or the slightest change of position.

PHYSICAL SIGNS.—When the effusion is considerable, prominence of the præcordia, with bulging of the intercostal spaces, extensive dulness, reaching sometimes from nipple to nipple, and nearly the whole length of the sternum; the pulsations of the heart imperceptible when the patient lies down, and shifting their place in the erect and semi-erect posture; the sounds indistinct in the region of the heart, but more audible at the upper part of the chest; the dulness on percussion varying its situation and extent with the posture of the patient. This part of the diagnosis requires the patient to assume successively the supine, and the erect or semi-erect postures, and to lie on either side.

PROGNOSIS.—Extremely unfavourable.

CAUSES.—Long-continued obstructions to the circulation of blood through the lungs, or through the parietes of the heart.

TREATMENT.—That of dropsies in general, by drastic purgatives and diuretics, modified according to the state of the patient and existing complications, and assisted by large blisters to the region of the heart, kept open by savin ointment. In a few cases, where the accumulation of serum has been very large, and the disease is free from other visceral complication, tapping has been practised with success. The spot selected for the operation is the fifth intercostal space, through which a trocar of small size is introduced—from below upwards.

DISEASES OF THE ARTERIES.

ANEURISM OF THE AORTA.

SPECIES.—1. Thoracic; 2. Abdominal.

1. ANEURISM OF THE THORACIC AORTA.

SYMPTOMS.—The general symptoms produced by an aneurismal tumour in the chest are the same as those due to any other tumour of equal size and similar situation—*dyspnœa*, by encroaching on the lungs; a harsh, harassing cough, with little or no expectoration, by pressing on the bronchial tubes; *aphonia*, by compressing the recurrent laryngeal nerves; *dysphagia*, by pressing on the œsophagus; *obstruction to the venous circulation*, accompanied in extreme cases by dropsical effusions into the cellular membrane of the face, neck, chest, and upper extremities, by compressing the large venous trunks; *neuralgia of the back, and paraplegia*, from pressure on the spine, followed by absorption of the vertebræ; *inanition*, by pressing on the thoracic duct.

DIAGNOSIS.—Difficult, when the tumour occupies the origin of the aorta, or when, whatever its situation, it is of small size. When the tumour occupies the more remote portions of the aorta, or its first branches, and especially when it has so far increased as to rise out of the chest, the diagnosis becomes comparatively easy. When, again, the tumour, by its gradual increase in size, causes the protrusion of the sternum or ribs, or leads to their absorption, we are much assisted in the diagnosis, for in such cases there is always a *primâ facie* evidence in favour of aneurism.

Our first suspicion as to the nature of the tumour would be confirmed by the existence of pulsation in the tumour; by a sudden and copious hæmorrhage of bright-red blood, or a less amount, often repeated, from the lungs or stomach; by a *whizzing* or bellows sound, sometimes single, more rarely double, in the situation of the tumour;

by a peculiar thrilling sensation communicated to the hand; and by a quick thrilling pulse, generally much increased in frequency. Hæmorrhage from the lungs will have additional value as a sign of aneurism in the ascertained absence of symptoms of pulmonary consumption. When the tumour occupies the arch of the aorta, or the large vessels of the neck, or upper extremity, we may expect to find some marked change in the pulse at the wrist and in the neck. Sometimes there is an absence of the pulse at the wrist, of one or of both arms, and occasionally of one or both carotid arteries; and there are signs of disturbed circulation through the brain, such as giddiness, faintness, and indistinctness of vision. It is necessary to add, that the peculiar whizzing sound and the *bruit de soufflet* are not always present in aneurism.

PROGNOSIS.—Unfavourable, but guarded, as a natural cure is sometimes effected. The disease may last for a considerable period before it proves fatal.

TREATMENT.—Perfect repose of mind and body, temperance, a moderate diet, a free state of bowels, occasional cautious depletion when urgent symptoms require it; a belladonna plaster to the region of the heart, and digitalis in moderate doses to keep down the action of the heart. The dry harsh cough will require the use of sedatives (extract of conium or stramonium), with expectorants (such as the compound squill pill); and anasarca must be treated by the remedies prescribed under that head.

2. ANEURISM OF THE ABDOMINAL AORTA.

SYMPTOMS.—These also vary with the size and situation of the tumour, and the viscera upon which it presses. When the aneurism presses on the stomach, it gives rise to severe symptoms of dyspepsia; on the nerves of the solar plexus, to neuralgic pains; on the bowels, to obstinate constipation or violent colic; on the nerves issuing from the spine, to severe pain in the loins, abdominal parietes, or lower extremities, simulating rheumatism of those parts, or sciatica, or lumbar or psoas abscess, or disease of the spine. By pressure on the rectum, it has sometimes led to a suspicion of stricture of that part, and it has been confounded with disease of the liver, spleen, or kidney. When the tumour occupies the upper portion of the abdominal aorta it may thrust up the diaphragm, and give rise to dyspnœa, and other symptoms of pulmonary disease.

DIAGNOSIS.—By careful examination the tumour may often be found to occupy the situation of the aorta; it may be felt strongly pulsating, and having the peculiar *thrill* just described; and on applying the stethoscope, a short, harsh, bellows murmur may be distinctly heard. The pulsation is more uniformly diffused over an aneurismal tumour, than over any other abdominal tumour lying over the aorta; and the bellows sound is more harsh and grating than that occasioned by the pressure of such other tumours. It should be borne in mind

that the pulsation of a healthy aorta may be communicated to a tumour seated over it.

The prognosis and treatment are the same as those of aneurism of the thoracic aorta.

DISEASES OF THE VEINS.

PHLEBITIS	Inflammation of the Veins.
PHLEGMASIA DOLENS .	White Leg.

PHLEBITIS—INFLAMMATION OF THE VEINS.

SYNONYMS.—Pyæmia, or pyohæmia, applied to the contamination of the blood with pus, which often follows phlebitis.

SYMPTOMS.—When occurring in the superficial veins, swelling and induration, sometimes accompanied by redness, in the course of the veins; pain increased by pressure; œdema of the cellular tissue, and enlargement of the veins below the seat of the disease; rigors, followed by profuse sweats, offensive diarrhœa, great debility, anxiety, and irritability; a very frequent, weak, and sometimes intermittent pulse; a dry, brown tongue; and a yellow, muddy skin. As the disease advances, the joints often become painful and tender, symptoms of inflammation of the viscera, or their serous investments, show themselves, and collections of matter, with little or no inflammation of the surrounding textures, form in different parts of the body.

CAUSES.—*Predisposing.* Cachexia. *Exciting.*—In rare instances, cold; in most cases, inflammation spreading from surrounding tissues, or injury done to the veins themselves, as in bleeding, amputation, extraction of tumours, tying varicose veins, and operations for hæmorrhoids. Phlebitis is also apt to supervene on fractures or on operations performed on bones; and it often originates in injuries to the veins of the internal viscera, as of the uterus after childbirth, and the umbilical cord of new-born children.

ANATOMICAL CHARACTERS.—Discoloration of the inner coat of the vein; inflammation and thickening of the other coats; inflammation and suppuration of the surrounding textures; formation of coagula within the vein, which coagula are either discharged through an abscess of the cellular tissue surrounding the vein, or they are softened down, and conveyed into the current of the circulation, leading to deposits of pus in the cellular tissue of the trunk and limbs, in the joints and serous cavities, or in the lungs, liver, spleen, or kidneys: especially the lungs and liver.

DIAGNOSIS.—From *absorbent inflammation*, by the larger size of the inflamed vessel, the vein feeling like a large, hard, knotted cord.

PROGNOSIS.—Unfavourable, but guarded; more favourable in inflammation of the external veins, and especially when it arises upon-

taneously, or from cold. Less favourable in phlebitis following wounds, or injury to the veins of the internal viscera. Secondary abscesses in external parts of the body may be regarded as a favourable indication.

TREATMENT.—Leeches in the course of the inflamed vessel. A position favourable to the return of blood to the heart. Warm fomentations, or, if more agreeable to the patient, cold lotions. If the accompanying fever is of the inflammatory type, tartar-emetic and aperients, or calomel and opium; if of the typhoid type, wine, brandy, and diffusible stimulants, in combination with opium. In most cases the strength must be supported by bark or quinine, with a liberal allowance of wine or brandy. Close attention should be paid to uneasiness or pain in parts of the body remote from the seat of the disease, as indicating collections of pus requiring prompt relief by the knife.

PHLEGMASIA DOLENS—WHITE LEG.

SYNONYM.—Phlegmasia alba.

SYMPTOMS.—From one to five weeks after delivery, a painful elastic swelling of one or both lower extremities, beginning generally in the groin, labia, and thigh, and thence extending downwards; characterised by great heat and tenderness, a pale, shining appearance of the surface, and stiffness of the limb. It is commonly ushered in by rigors, with pain in the loins or belly; and is accompanied by fever, thirst, a quick and frequent pulse, headache, nausea, and a furred tongue.

CAUSES.—*Predisposing.* The puerperal state. *Exciting.*—Inflammation of the iliac and femoral veins, generally commencing in the veins of the uterus and viscera of the pelvis.

DIAGNOSIS.—From *œdema*, by the absence of pitting on pressure. From *common inflammation* by the pale, shining aspect of the surface.

PROGNOSIS.—Generally favourable, but recovery often tardy.

TREATMENT.—In acute cases, leeches to the most painful parts of the limb; warm fomentations; opium in large doses, with calomel, or blue pill, given so as to affect the mouth. From half a grain to a grain of opium, with two grains of blue pill, may be given three or four times a-day, till the system is sensibly affected. The limb should be placed in the horizontal position or slightly raised; and the bowels should be kept free. If there is much fever present, a sixth of a grain of tartar-emetic may be combined with the opium and blue pill. In chronic cases, after the inflammation has subsided, the iodide of potassium (gr. iij. to gr. v.) in combination with the decoction of sarsaparilla.

CHAPTER III.

DISEASES OF THE ORGANS OF RESPIRATION.

1. Of the Larynx and Trachea.
2. Of the Bronchial-tubes and Air-cells.
3. Of the Substance of the Lungs.
4. Of the Pleura.

DISEASES OF THE LARYNX AND TRACHEA.

LARYNGITIS	Inflammation of the Larynx.
TRACHEITIS	Croup.
LARYNGISMUS STRIDULUS .	Crowing inspiration.

LARYNGITIS—INFLAMMATION OF THE LARYNX.

SYNONYM.—Cynanche laryngea.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE LARYNGITIS.

SYMPTOMS.—After rigors, followed by pyrexia, and usually by some degree of inflammation in the tonsils, there is a hoarse voice; a husky and convulsive cough; with pain and a sense of constriction in the larynx, generally increased by pressure, and constant hawking of glutinous mucus. The respiration is difficult and sonorous; and the act of swallowing painful, and often followed by convulsive fits, coughing, and dyspnœa. The fauces are generally red and swollen; and, if the tongue be pressed downwards and forwards, the epiglottis may be seen thickened and inflamed. There is inflammatory fever, with flushed face, hot skin, and full hard pulse. These symptoms are followed by others of a more formidable character. The countenance becomes pale and anxious; the lips livid; the eyes suffused; the nostrils expanded; the pulse frequent, feeble, and irregular; the voice reduced to a whisper, or lost; the throat often œdematous. There is extreme restlessness; jactitation; urgent fear of suffocation; sleeplessness, or, if the patient doze, he wakes in dreadful agitation, gasping and struggling for breath. Delirium and coma ensue, and death takes place in from four to five days, or the patient dies at an earlier period, suffocated.

ANATOMICAL CHARACTERS.—Injection and thickening of the lining membrane of the larynx, with œdema of the submucous tissue, and

surrounding cellular membrane, the glottis and epiglottis red and swollen, and containing serum, sero-purulent fluid, or pus. In some cases, œdema of the glottis is the only post-mortem appearance.

CAUSES.—*Predisposing.* Previous attacks of cynanche tonsillaris, intemperance, abuse of mercury, frequent and continued exertions of the voice; the adult age. *Exciting.*—Exposure to wet and cold; extension of inflammation from the tonsils or salivary glands; swallowing scalding or corrosive liquids; inhaling acrid gases or hot air; extension of inflammation in erysipelas, scarlatina, small-pox, and measles.

DIAGNOSIS.—From *diseases of the chest* by the local affection and the absence of the physical signs of those diseases; from *spasmodic affections of the larynx*, by the presence of fever and local pain, and by the gradual progress of the disease; from *tracheitis*, by the absence of the peculiar stridulous voice, and of the croupy inspiration. The subjects of laryngitis are also, as a general rule, much older than patients suffering from croup.

PROGNOSIS.—Most unfavourable; especially if the disease have already lasted some time, without any abatement of the symptoms, and when the dyspnœa is extreme, the convulsive fits of frequent occurrence, the face livid, the circulation languid, and the head affected. On the other hand, a decrease of dyspnœa, a free expectoration, an improved aspect of countenance, and greater ease in swallowing, are favourable signs.

TREATMENT.—*Indications.* I. To reduce inflammatory action and prevent effusion. II. Effusion having taken place, to promote the absorption of the effused matter. III. In extreme cases, to remove the mechanical obstruction to the respiration.

I. Inflammatory action can be reduced, and effusion prevented only by the most prompt and active measures. Bleeding to the *approach* of syncope, repeated, if necessary, and followed by tartarized antimony, in combination with calomel and opium in full doses. We may give two, three, or four grains of calomel, with from an eighth to a sixth of a grain of tartarized antimony, and a third or half of a grain of opium every one, two, or three hours, according to the urgency of the symptoms. The object of this treatment is to reduce inflammation by means of the tartar-emetic, to supersede inflammatory action by inducing salivation as speedily as possible by the mercury, and to soothe existing irritation by the opium. The local treatment, in the early stage, consists in leeches to the throat. (Counter-irritants should be reserved for the more advanced stages of the complaint.) Ice should be held in the mouth, and applied around the throat.

II. The second indication is fulfilled by mercury, and by that alone. This remedy should be resorted to without loss of time. It may be taken internally and rubbed in at the same time. When effusion has actually taken place, bleeding is of little use, except to counteract the urgent symptoms which may supervene. Counter-irritation may now

be employed with advantage in the form of blisters, acetum cantharidis, or strong ammonia, to the side of the neck. Where laryngitis supervenes on other diseases, the treatment must be appropriate to both complaints, and be modified according to the state of the system.

III. The mechanical effects of the inflammation and effusion can be obviated, and the obstruction to the respiration removed only by making an opening into the trachea. When, in spite of remedies, the dyspnœa increases rapidly, and there is urgent danger of suffocation, an operation should be resorted to without loss of time. After the operation, the edges of the opening must be kept separated, so as to admit the free passage of air.

Throughout the treatment the patient should be prevented from talking.

2. CHRONIC LARYNGITIS.

SYMPTOMS.—Hoarseness, sometimes increasing till the voice is reduced to a whisper, or quite lost; dry, husky cough; pain or soreness in the larynx, increased by lateral or backward pressure. The cough is brought on by any unusual exertion, or by the inhalation of cold air, and is accompanied, in the first stage, with scanty mucous expectoration; in more advanced cases, and where ulceration is present, with purulent sputa, mixed with streaks of blood; or there is a sanious fetid expectoration. In confirmed cases, dyspnœa is an invariable attendant, coming on generally in paroxysms, and leaving the patient nearly free in the intervals. In the last stage of the disease, the dyspnœa is increased to orthopnœa, obliging the patient, during the fits, to sit up in bed. In the intervals of the fits the breathing has a peculiar hissing sound. The patient does not long survive the appearance of orthopnœa, and generally dies asphyxiated.

ANATOMICAL CHARACTERS.—Inflammation and its consequences in the mucous and submucous textures of the larynx; enlargement of the mucous follicles; œdema; ulceration of the mucous membranes; ossification, or caries of the cartilages.

CAUSES.—The acute form, of which it is often the sequel; catarrh; indulgence in spirituous liquors; excessive exertions of the voice; injuries to the larynx; the inhalation of air loaded with dust or irritating particles of matter; syphilis; the abuse of mercury; tuberculous matter deposited in the mucous membrane of the larynx. Ulceration from this last-named cause occurred in about a fourth of the cases of phthisis quoted by Louis.

DIAGNOSIS.—By the permanent change of the voice, the cough, the hissing breathing, and the pain or tenderness in the larynx. Tubercular laryngitis may often be distinguished from simple inflammation or relaxation, by the coexistence of the symptoms and physical signs of phthisis. (See Phthisis Pulmonalis.)

PROGNOSIS.—The absence of signs of disease of the chest is favourable; as is also its evident dependence upon some mechanical cause, or

on syphilis. The continuance of the symptoms, without intervals of freedom, is highly unfavourable.

TREATMENT.—*Indications.* I. To reduce the chronic inflammation. II. To promote the absorption of effused fluids. III. In cases of relaxation of the mucous membrane, to restore tone to the part. IV. To relieve urgent symptoms. V. To improve the general health.

I. The chronic inflammation of the larynx may be subdued by the repeated application of a few leeches to the upper part of the throat, and by counter-irritants, such as blisters, mustard-poultices, and tartar-emetic ointment. The part itself should, at the same time, be kept at rest, the patient being prevented from talking more than is necessary, and never above a whisper.

II. To fulfil the second indication, mercury should be given in small doses, so as to affect the mouth, or the iodide of potassium, in five-grain doses, three or four times a-day.

III. To restore the tone of the relaxed mucous membrane, various remedies have been recommended: the inhalation of steam holding some gentle stimulant in solution, as ammonia, camphor, turpentine, or one of the balsams; or the still stronger stimulants, applied directly to the part, in a liquid or solid form. Nitrate of silver, corrosive sublimate, and sulphate of copper, have been recommended for this purpose. The preference should be given to a strong solution of the nitrate of silver, applied by means of a small probang to the epiglottis and upper part of the larynx. If solid substances are preferred, they must be used in the form of an impalpable powder, and drawn into the larynx through a tube. Nitrate of bismuth; calomel with twelve times its weight of sugar; red precipitate, sulphate of zinc, or sulphate of copper, mixed with thirty-six times their weight of sugar; alum with twice its weight; and acetate of lead with seven times its weight —are remedies suitable for this purpose.

IV. The urgent symptoms consist chiefly in paroxysms of dyspnœa or convulsive cough. These may be relieved by narcotics and sedatives, such as opium, æther, camphor, belladonna, or stramonium, inhaled or given internally. The lozenge is the most convenient form. Where urgent symptoms are found to admit of no relief, an operation may be necessary.

V. The improvement of the general health may be brought about by tonics, especially steel, nourishing and wholesome diet, bracing air, the cold or shower bath, and strict attention to the stomach and bowels, and to the state of the secretions generally.

TRACHEITIS—THE CROUP.

SYNONYM.—Cynanche trachealis.

SYMPTOMS.—The disease generally begins with hoarseness and wheezing, and a short dry cough. Sometimes there is a rattling in the throat

during sleep, the child often raising the hand to the throat. After a time the breathing becomes difficult, and the breath is drawn in with a sound resembling the passing of air through muslin, or through a metallic tube; and the voice, in speaking and coughing, acquires a shrill and peculiar sound, similar to the crowing of a cock, or to the noise which a fowl makes when caught in the hand. At first the cough is dry; but at length a viscid matter is brought up, and flakes or tubes of false membrane, with efforts often so distressing as to threaten strangulation. The disease is accompanied by the symptoms of inflammatory fever, with hot skin and flushed face, and most frequently terminates fatally about the second or third day, when the patient dies suffocated.

ANATOMICAL CHARACTERS.—Inflammation of the lining membrane of the trachea, and the consequent formation of a false membrane, which, in extreme cases, fills the trachea and bronchi. Large portions of this false membrane, bearing the shape of the tube, have been expelled during fits of coughing and vomiting. The inflammation generally extends upwards to the larynx as well as downwards to the bronchi.

CAUSES.—*Remote and predisposing.* Childhood, between the ages of three and fourteen; low and damp situations, inland, or on the seashore. *Exciting.*—The common causes of inflammation. The disease is sometimes epidemic, and is by some supposed to be contagious.

DIAGNOSIS.—By the peculiarity of breathing, of speaking, and of coughing above described.

From *laryngismus stridulus.*—See that disease.

PROGNOSIS.—Very unfavourable. *Favourable symptoms.*—Early and copious expectoration, the breathing not much impeded, the voice little changed, the febrile symptoms moderate. *Unfavourable.*—Great anxiety and difficulty of breathing, violent fever, the sound of the voice becoming more acute; no expectoration.

TREATMENT.—*Indications.* I. To subdue inflammation. II. To obviate urgent symptoms.

I. The first indication is fulfilled by bleeding from the arm, or, in the case of very young children, by the free application of leeches to the larynx and trachea. The abstraction of blood should be followed up by a warm bath and tartar-emetic in nauseating doses. The treatment may be commenced by an emetic of from half a grain to a grain of tartar-emetic, according to the age of the child. The bowels should also be freely opened.

Calomel should be combined with the tartar-emetic, so as promptly to affect the system, and prevent the further effusion of lymph; and as it is important to affect the system as rapidly as possible, mercurial ointment may be rubbed into the thighs or axillæ. Mercury may be used with the more freedom in children, as the system is with difficulty affected by it.

II. If the symptoms become extremely urgent, the false membranes may sometimes be brought up by the operation of an emetic. When

partially discharged by coughing, they should be carefully removed by the hand. If suffocation is threatened, the operation of tracheotomy must be performed. This operation, however, generally fails, as the inflammation is not confined to the larynx, but extends through the whole length of the air-passages.

In extreme cases, sinapisms or blisters should be applied to the legs. In the case of children, the former should not be left on more than five or ten minutes, and the latter above three hours.

LARYNGISMUS STRIDULUS—SPASMODIC CROUP.

SYNONYMS. — Crowing inspiration; child-crowing; spasmodic asthma of children; thymic asthma.

SYMPTOMS.—The principal feature of the disease is a remarkable crowing inspiration, unattended by cough, coming on suddenly, and often on first waking from sleep. For a short time, the child makes ineffectual efforts to inspire air, and struggles violently, but at length the difficulty is overcome, and the breath is drawn in with a loud crowing sound. If the impediment is less complete, the respiration is hurried and laborious, each inspiration being attended by the peculiar crowing sound; the face becomes livid, the eyes staring and suffused, convulsions supervene, the thumbs are clenched in the hands, the fingers and toes are flexed, and the joints of the wrist and ankle forcibly bent. In extreme cases, death takes place by asphyxia, or the little patient falls, pale and exhausted, into the nurse's lap.

PATHOLOGY.—Irritation, reflected through the inferior or recurrent laryngeal nerve upon the muscles of the larynx, in consequence of remote irritation of the gums, stomach, or bowels. A diseased condition of the bronchial and cervical glands, producing irritation of the eighth pair and recurrent nerves.

CAUSES.—*Predisposing.* Infancy; from birth to the age of three years; the scrofulous diathesis. *Exciting.*—Teething; intestinal irritation; worms; enlargement of the absorbent glands of the neck and chest; cutaneous affections of the scalp and face.

DIAGNOSIS.—From *croup*, by the sudden accession and departure of the fits; by the freedom of the breathing in the intervals; by the absence of febrile or catarrhal symptoms; and, except in rare cases during the fit, of cough. Also, in most cases, by the presence of hot and swollen gums, glandular enlargements of the neck, and symptoms of intestinal irritation.

PROGNOSIS.—The disease sometimes proves fatal, but more commonly terminates favourably.

TREATMENT.—*During the paroxysm.* The patient should be placed in a warm bath, the face being exposed to a current of fresh air, and

cold water should be dashed over the face and chest. If suffocation is imminent tracheotomy must be performed. *During the intervals.*—The treatment must depend on the existing causes of irritation. If the disease continues when these are removed, change of air, a suitable diet, and attention to the state of the bowels, will generally effect a cure.

Spasmodic diseases of the larynx, with croupy respiration, and convulsive cough or loss of voice, are of frequent occurrence in females, and belong to the long list of anomalous hysteric affections. They must be treated in the same way as other hysterical symptoms.

DISEASES OF THE BRONCHIAL TUBES AND AIR-CELLS.

CATARRHUS	Catarrh.
CATARRHUS EPIDEMICUS . .	Influenza.
BRONCHITIS	Bronchitis.
ASTHMA	Asthma.
EMPHYSEMA	Emphysema.
PERTUSSIS	Whooping-cough.
BRONCHIAL POLYPI.	

CATARRHUS—CATARRH.

Acute catarrh, commonly called "a cold," is a febrile affection, complicated with inflammation of one or other of the mucous membranes. If confined to the mucous membrane of the eyes and nostrils, it is called *coryza*, or *a cold in the head;* if it extend to the bronchial tubes, it is termed *bronchitis;* if it attack the mucous membrane of the bladder, it becomes a *catarrhus vesicæ*. Sometimes the inflammation, instead of attacking the mucous membrane of the air-passages, affects that of the alimentary canal, and is attended with sickness and diarrhœa, or with both together, assuming the form of gastritis, enteritis, or gastro-enteritis mucosa. Its essential characters, therefore, are an increased secretion of mucus from the nose, fauces, bronchi, intestinal canal, or bladder, attended with pyrexia.

SYMPTOMS.—Slight rigors followed by pyrexia; weight and pain in the head; oppression of the chest, and impeded respiration; sense of fulness and stopping up of the nose; repeated sneezing; watery inflamed eyes; cold shiverings, succeeded by transient flushes of heat; soreness of the fauces and tonsils; herpetic eruptions on the lips; cough; pains about the chest; rheumatic pains in the back, neck, and head. After an interval of time, increased secretion of mucus from the mucous membrane of the nose, fauces, bronchi, &c. When the disease assumes the chronic form, the symptoms are those of inflammation of the mucous membrane originally or principally affected. As this is most frequently the mucous membrane of the air-passages, "catarrhus" and "bronchitis" are frequently employed as synonymous terms.

CAUSES.—Cold, or wet and cold, applied to the body. Contagion?

PROGNOSIS.—It is seldom attended with immediate danger, but often lays the foundation for serious diseases.

TREATMENT.—*Indication.* To reduce the existing fever and allay irritation.

In the majority of cases the best treatment of a cold is by ten grains of Dover's powder given over night, followed by the warm bath, or warm water to the feet, a basin of warm gruel, and a hot bed. By these means a profuse perspiration is excited, which effectually removes the febrile action. The Dover's powder may be followed up next morning by a saline aperient. Ten or fifteen drops of chloric æther may be substituted for Dover's powder. A large draught of cold water, taken at bed-time, will often effectually remove a common cold. If the fever run high, the best remedy is tartar-emetic in nauseating doses and at short intervals, with cooling drinks and saline purgatives.

If there is much smarting and running at the eyes, relief may be obtained by holding the head over the steam of hot water, or bathing the eyes repeatedly with warm water. For the remedies appropriate to the other inflammations, see the diseases themselves.

CATARRHUS EPIDEMICUS—INFLUENZA.

SYNONYMS.—Epidemic cough. La grippe.

SYMPTOMS.—Those of a common cold in their most marked form, with a sudden and extreme prostration of strength, loss of energy, and depression of spirits. The febrile symptoms, which generally assume a remittent type, do not run high, nor is the pulse much increased in frequency. Sometimes the catarrhal symptoms are very slight, the disease being characterised by extreme debility without accompanying local symptoms.

TERMINATIONS AND COMPLICATIONS.—Pneumonia is a very common complication. Bronchitis is also a frequent, and pleurisy an occasional, occurrence. Cynanche tonsillaris; inflammation of the brain or its membranes; muscular and articular rheumatism; diarrhœa and dysentery; erysipelas; typhus.

CAUSES.—*Predisposing.* The male sex; the adult age; and especially old age; a former attack; low, damp situations. *Exciting.*—A peculiar condition of the atmosphere.

Laws of the Epidemic.—The influenza has been epidemic in the years 1510 and 1557; in 1729, 1733, 1743, 1762, 1775, and 1782; in 1830, 1837, 1841, 1844, 1847, and 1851. It seems to have originated in the East, and after an uncertain period to have shown itself in the north of Europe, whence it has spread westward till it reached England; and from England has passed in a south-easterly direction to France, Spain, and Italy, and across the Atlantic to America. Its

course is very similar to that of the Asiatic Cholera, of which it has more than once proved the precursor. Australia has been visited in recent epidemics. The disease, in every epidemic, has attacked a very large proportion (estimated at three-fourths, four-fifths, and nine-tenths) of the population, and is believed to have attacked the domestic animals. The mortality occasioned by it is considerable. In a million inhabitants of the metropolis the registered deaths from influenza were 65 in 1844, 117 in 1841, 150 in 1851, 295 in 1848, and 572 in 1847. In this last year the total deaths in the metropolis from this cause were 1253. Its latent period is believed to be from a few hours to two or three weeks. It commonly remains in the same district or country from a month to six weeks.

DIAGNOSIS.—From *common catarrh*, by its greater prevalence, the suddenness of its attack, the extreme debility which attends and follows it, and by its occurring indifferently at all seasons of the year, and in all states of the atmosphere. From common *ephemeral fever*, by the extreme prostration, and in many cases by the herpetic eruption on the lips.

In the epidemic of 1844–45, several cases of influenza assumed a well-marked remittent character, with exacerbations on alternate days, and the herpetic eruption on the lips. (G.)

PROGNOSIS.—Rarely fatal to the young and robust, unless it be complicated with very severe local affections; dangerous to the aged, to the feeble, and the intemperate, and to persons subject to asthma and consumption.

TREATMENT.—In mild cases, that of catarrh; in severe ones and in aged persons, stimulants, combined with opiates (℞. Ammoniæ sesquicarb. gr. v. Tinct. opii ℥v. Mist. camphoræ ℥i., ter die), with a nourishing diet, and liberal use of wine, and local treatment appropriate to the existing complication. General blood-letting is contra-indicated, except in very rare instances. For the treatment of local complications, see the several diseases themselves; but bearing in mind the adynamic character which they assume in influenza. Change of air is among the best remedies, and should be prescribed as soon as the severe symptoms have passed away.

BRONCHITIS.

SPECIES.—1. Acute; 2. Chronic; 3. Bronchitis, vel Catarrhus senilis.

1. ACUTE BRONCHITIS.

SYMPTOMS.—The general symptoms are those of catarrh in its most severe form; or they are those of common continued fever. The symptoms referable to the chest are oppression and sense of constriction, rarely attended with actual pain, within the chest, but often com-

bined with muscular pains, which are a part of the original catarrh, or the consequence of the effort of coughing. The pain is not increased by a deep and slow inspiration. There is dyspnœa, with a loud wheezing sound, increased by exertion, and cough attended by expectoration, which is scanty at first, then more copious, of a white glairy appearance, resembling white of egg; in still more advanced stages it is muco-purulent or purulent, and sometimes, though rarely, tinged with blood. Towards evening, there is generally an increase of feverish symptoms. In favourable cases, the disease abates between the fourth and eighth day, the dyspnœa subsides, the expectoration gives more relief, the febrile symptoms disappear, and the patient recovers; or the disease passes into the chronic form.

Acute bronchitis often occurs in children; its most severe and urgent form has received the name of suffocative catarrh, and is characterised by a sudden and copious secretion of mucus, accompanied by extreme and urgent dyspnœa.

2. CHRONIC BRONCHITIS.

SYMPTOMS.—This disease is the sequel of the acute form, or commences as a common cold in the young and middle-aged, and continues a month or two. In middle-aged or old persons it returns every winter with increased severity, and reappears for several years in succession; in which case it is called winter cough. When the mucous membrane secretes freely, and the breathing is very difficult, the disease is called humoral asthma. The symptoms of this disease are habitual cough, shortness of breath, and copious mucous expectoration. After repeated attacks of the disease, the bronchitis is generally complicated with emphysema of the lungs, marked by increased dyspnœa, and a peculiar dusky hue of countenance. The sufferings of the patient are often increased by flatulence.

3. BRONCHITIS SENILIS.

SYNONYM.—Catarrhus senilis. Peripneumonia notha.

SYMPTOMS.—This, as the name implies, is a disease of advanced age: its symptoms are those of chronic bronchitis, with the addition of drowsiness, extreme debility, and coldness of the surface. The patient, growing weaker and weaker, at length expires without suffering, suffocated by the accumulated mucus, which he has no longer strength to expectorate. It generally occurs during several successive winters before it proves fatal.

ANATOMICAL CHARACTERS.—Redness of the tracheal or bronchial mucous membrane to a greater or less extent. This redness is observed most commonly at the termination of the trachea, and in the first divisions of the bronchi. The air-passages contain a large quantity of mucous or muco-purulent fluid. In the chronic form, parts of the lungs are generally found emphysematous (see Emphysema), and other portions are the seat of partial pneumonia. (See Pneumonia.)

PHYSICAL SIGNS.—Sound on *percussion* clear, or slightly duller than natural. Sonorous and sibilant rhonchi in the first stage, followed by the mucous and submucous rhonchi. These sounds are often heard without applying the ear to the chest. The death-*rattles* are caused by an accumulation of mucus in the bronchial tubes. In chronic bronchitis, bronchophony, or pectoriloquy, is heard over the site of the enlarged bronchial tubes, while in other limited portions of the lung may be heard the sounds characteristic of emphysema or pneumonia. (See those diseases.)

SEQUELÆ.—Hypertrophy of the heart, ascites, and anasarca.

TREATMENT.—*Of acute bronchitis.* In very acute attacks, occurring in persons previously in strong health, general blood-letting, followed by tartar-emetic in nauseating doses, may be necessary. When the disease is less severe, and the general health is unimpaired, local depletion, followed by counter-irritants to the chest, will be required, and the compound squill pill, alone or in combination with extract of conium, given three or four times a-day. (℞. Pil. scillæ c. gr. vi. Ext. conii gr. iv.) When the cough comes on in fits, a lozenge containing a sixth of a grain of extract of stramonium often proves serviceable. In the bronchitis of children, emetics are very serviceable by promoting expectoration.

In the chronic form of bronchitis, the treatment must be nearly the same as in the milder form of the acute disease, except that depletion will rarely be required. The compound squill pill is here an excellent remedy, and it may be advantageously combined with Dover's powder or the extract of conium. When there is a considerable collection of mucus in the air-tubes, with urgent dyspnœa, an emetic may be given early in the morning, or twice in the week, with the greatest advantage. The chest and body should be kept warm, and the chest itself may be protected by a full-sized emplastrum roborans.

In bronchitis senilis.—When the debility is extreme, and in all cases of *bronchitis senilis*, the appropriate remedy is a combination of stimulants and narcotics. One of the best consists of five or ten grains of sesquicarbonate of ammonia, with five minims of laudanum in an ounce of camphor mixture. A nourishing diet and a liberal allowance of wine are also required. When dropsical effusions supervene, diuretics and expectorants must be given in combination with stimulants. Those who are subject to bronchitis should avoid all unnecessary exposure to cold. This is more especially necessary, in the bronchitis of old people. The rooms which they inhabit should, therefore, be kept warm, and as nearly as possible of a uniform temperature night and day; the chest and extremities should be carefully protected from cold; and they should avoid exposing themselves to cold air. If obliged to leave their rooms during the winter, they should use a respirator, or what answers nearly as well, a folded handkerchief held before the mouth. In many cases, exposure to cold air gives temporary relief, but the symptoms return with renewed severity when the circulation is restored by the warmth of the room.

REMEDIES.—*In chronic bronchitis.* Oil of turpentine, balsam of copaiba, lobelia inflata, colchicum, and the inhalation of chlorine, iodine, or tar vapour.

ASTHMA.

DEFINITION.—Dyspnœa occurring in paroxysms, with intervals of freedom of respiration.

SPECIES.—1. Humoral asthma. 2. Congestive asthma. 3. Spasmodic asthma. 4. Hay asthma. 5. Hysteric asthma.

1. HUMORAL ASTHMA.

SYNONYMS.—Bronchorrhœa, or bronchial flux.

SYMPTOMS.—The attack is usually preceded by a sensation of fulness at the pit of the stomach, lassitude, depression of spirits, drowsiness, and pain in the head. On the approach of evening a sense of tightness is perceived across the breast, with difficulty of breathing, which continues to increase for some length of time. Both inspiration and expiration are performed slowly, and with a loud wheezing noise, and there is a dry cough. The face is either turgid and livid, or pale and contracted. At length the difficulty of breathing becomes so great that the patient, threatened with immediate suffocation, leaves his bed, paces up and down his room, or stands in a stooping posture; or sits with the body bent forwards, the arms resting on the knees, the shoulders raised, the abdomen contracted, and all the muscles of respiration thrown into violent action; and still finding no relief, seeks at the open window a supply of cold air. These symptoms usually continue till towards the approach of morning, when a copious expectoration of a thin frothy mucus comes on, the breathing becomes less laborious and more full, the patient speaks and coughs with greater ease, and, feeling every way relieved, soon falls asleep. The dyspnœa and tightness across the chest remain for some days after the attack, and for several succeeding evenings an exacerbation occurs similar to that above described. In some cases the fit begins suddenly after midnight, the patient awaking with the fit upon him.

PHYSICAL SIGNS.—Sound on percussion generally good, but in extreme cases dull. Sonorous and sibilous rhonchi at the commencement of the attack, followed by the mucous, submucous, and subcrepitant rhonchi. Some degree of wheezing and sibilus usually remains after the attack.

ANATOMICAL CHARACTERS.—Not constant. The mucous membrane is generally free from disease; but some affection of the heart, particularly of the right side, is not uncommon. Miliary tubercles,

and extensive disease of the bronchial glands, have been met with in fatal cases. Emphysema is a common occurrence in this, as in the other forms of asthma.

CAUSES.—*Predisposing.* Hereditary peculiarity; lax habit of body; long-continued dyspepsia; gout. *Exciting.*—Sudden changes of temperature; disorders of the primæ viæ, especially flatulence; certain effluvia, as of hay or ipecacuanha.

DIAGNOSIS.—From other diseases affecting the respiration, by the distinct paroxysms with intervals of perfect freedom. From congestive and spasmodic asthma by the copious secretion of mucus which terminates the fit.

PROGNOSIS.—*Favourable.* Youth and unimpaired constitution, and the absence of organic disease. *Unfavourable.*—Repeated attacks; old age; debility; organic disease.

TREATMENT.—*Indications.* I. To shorten the paroxysms and relieve urgent symptoms. II. To prevent the recurrence of the fits, by removing the predisposing and exciting causes.

I. The first indication may be fulfilled by an emetic at the onset of the attack, but this is inadmissible where there is great debility. In strong and healthy persons full doses of tartar-emetic, of ipecacuanha, or of the lobelia inflata (from twenty to thirty drops of the tincture) may be given with great advantage. In the debilitated, stimulants are required, such as strong coffee, ammonia, or æther. These may be combined with opium in moderate doses. Heat applied to the extremities, or to the entire surface, by means of the warm or vapour bath, is extremely serviceable, but should be applied at the onset of the attack. When the fit has already lasted some time, and the expectoration is abundant, provided that there are no severe or dangerous symptoms, it is best to leave the patient to himself, as the increased secretion is the best relief to the breathing.

II. The exciting causes must be carefully avoided, the general health must be preserved, and the state of the digestive organs be carefully attended to. The bowels should be kept free, but hypercatharsis must be avoided; liquids should be taken in moderation; the diet should consist of a due mixture of animal and vegetable food, but acescent fruits and such vegetables as occasion flatulence should be taken sparingly. The internal remedies will vary with the state of the system.

I have found alum, in combination with ginger, very serviceable in removing the distressing flatulence which often precedes and accompanies the fit. Ten grains of the one, with five grains of the other, and three or four grains of rhubarb, may be given three or four times a-day. I have also more than once met with tenderness on pressure in the cervical and dorsal regions, and have used tartar-emetic ointment with much benefit. (G.)

2. CONGESTIVE ASTHMA.

SYNONYM.—Dry catarrh.

This resembles the foregoing variety by coming on in paroxysms of severe dyspnœa, but differs from it in the scanty expectoration which accompanies the cough, and terminates the fit. The sputa are small in quantity, highly adhesive, filled with air-bubbles, and speckled with round black or gray spots, and, at the height of the fit, often tinged with blood. After a time the sputa become more abundant and less tenacious, and the fit passes off with increased expectoration. The physical signs are those belonging to a swollen state of the mucous membrane of the air-tubes—viz., clear sound on percussion, indistinct respiratory murmur, with sibilant rhonchi, or a peculiar click, and, in limited portions of the chest, the mucous rhonchus.

ANATOMICAL CHARACTERS.—A deep red or violet colour of the mucous membrane of the air-tubes, with scanty mucous secretion.

CAUSES.—The same as in humoral asthma.

PROGNOSIS.—Generally favourable, except where the disease is of long standing, or complicated with other functional or organic derangements.

TREATMENT.—Nauseating expectorants, as tartar-emetic, squills, ipecacuanha, and the lobelia inflata, are indicated in this form of the disease, together with the inhalation of steam holding some stimulant in solution, such as tar-vapour, or ammonia. In the intervals, dry cupping and counter-irritation to the chest may be practised with advantage; and colchicum in combination with alkalis has been recommended. Smoking stramonium is sometimes found advantageous, as in spasmodic asthma. Strict attention must be paid to the state of the digestive organs; the bowels must be kept free by aloetic purgatives, and the general health must be carefully attended to.

3. SPASMODIC ASTHMA.

This term is applied to dyspnœa occurring in paroxysms, unaccompanied by signs of congestion or inflammation of the bronchial tubes, and presumed to depend on a spasmodic action of the muscular fibres of the air-tubes.

SYMPTOMS.—Those of humoral asthma; but that it comes on more suddenly, and terminates without expectoration.

PHYSICAL SIGNS.—Sound on percussion less clear than usual, respiratory murmur very faint, and occasionally accompanied with slight wheezing or whistling. If the patient is desired to hold his breath for a few seconds, or to count until the air in the chest is exhausted, and then to inspire slowly and steadily, the air will be heard to enter as usual. (Williams.) The respiratory murmur soon becomes feeble again.

CAUSES.—*Predisposing.* The same as in other spasmodic diseases; hereditary peculiarity; hysteria. *Exciting.*—Attacks of dyspepsia; extreme flatulence; irritation of the upper part of the spinal

cord; pressure of tumours on the pulmonary plexus or on the par vagum.

PROGNOSIS.—Favourable, in the absence of complications: dangerous when combined with other diseases of the lungs, or with those of the heart. It often lays the foundation of emphysema, pulmonary congestion, and hæmorrhage, and of dilatation and hypertrophy of the heart.

TREATMENT.—*Indications.* I. To relieve the patient's sufferings during the fit. II. To improve the general health, and give tone to the system during the intervals.

I. When the fit has actually commenced, some relief may be afforded by counter-irritants to the chest, epigastrium, and extremities; by antispasmodics, as opium, æther, chloroform, belladonna, assafœtida, and valerian. Opium and æther in combination (tr. opii ℥xx. to ʒss. and æther ʒss. to ʒi.) is a useful remedy in the fit. Strong coffee has been strongly recommennded by Pringle and Laennec. When the patient is aware of the approach of a fit, he may sometimes ward it off by an emetic, or by smoking stramonium or tobacco. Dashing cold water over the face and body will often succeed in preventing a paroxysm. Electricity has been used with the same view. The ascertained causes of the fit must of course be carefully avoided.

II. The state of the digestive organs demands particular attention: the diet should be light, wholesome, and easy of digestion; and all substances which encourage flatulence should be avoided. The state of the bowels must be carefully attended to. For the improvement of the general health, the shower-bath, or cold sponging, followed by frictions of the chest, should be employed every morning, and tonics should be administered in full doses. Where much flatulence is present, alum in combination with ginger may be given with advantage. If there is tenderness in any part of the spine, leeches may be applied, or the tartar-emetic ointment, or both.

When the spasm of the bronchial tubes is combined with congestion of the mucous membrane, or with increased secretion, the treatment must be varied accordingly. Depletion or counter-irritation must be employed with antispasmodic remedies. The same strict attention to the diet, to the state of the bowels, and to the general health, will be required in every form of asthma.

4. HAY ASTHMA.

SYNONYM.—Hay Fever.

SYMPTOMS.—Those of humoral asthma, with the addition of marked symptoms of catarrh.

CAUSES.—*Predisposing.* Peculiarity of constitution. *Exciting.*—The odour of hay, or that of a stable. In some cases fine powders floating in the air, especially powdered ipecacuanha.

TREATMENT.—That of humoral asthma during the paroxysm. In the interval, the careful avoidance of the exciting cause.

5. HYSTERIC ASTHMA.

SYMPTOMS.—This disease has its seat in the external muscles, and is closely allied to chorea and hysteria. It is characterised solely by extraordinary frequency of the respiration, with perfectly healthy sound of the chest and breathing. It is sometimes also a marked symptom of paralysis agitans, the muscles of respiration partaking of the affection of the other muscles. A frequent pulse, due to the hurried state of the respiration, is also a symptom of this disease.

A remarkable case of spasmodic asthma occurred in a female aged twenty-two, who came under my notice several years back as a patient of the Surrey Dispensary. The paroxysms, which were of variable duration, were characterised by extreme frequency of breathing, with comparatively little general disturbance of health, and perfect freedom of respiration. There was amenorrhœa, some tenderness of the upper part of the spine, and constipation. The disease was cured by purgatives judiciously and perseveringly administered. No other remedy was employed. Hypercatharsis was invariably followed by a paroxysm. I have seen a case of the same kind in which there were 140 respirations to 144 pulses. In this case much benefit was derived from cold affusion. (G.)

EMPHYSEMA.

SYMPTOMS.—Permanent shortness of breath, increased to extreme dyspnœa by occasional exciting causes, such as exercise, flatulence, or a common cold; and in extreme cases, by assuming the horizontal posture; with a dusky hue of countenance and cold extremities. Fits of orthopnœa, with violent palpitation and blueness of the face and lips, come on suddenly in the night, obliging the patient to sit up, and to open the doors and windows of his room for air. The dyspnœa is attended by cough, with scanty expectoration, which varies in character, consisting in most cases of a thin mucus, mixed with small tenacious clots, and filled with air-bubbles. The expectoration is often increased by a supervening attack of bronchitis; and it becomes abundant towards the end of the fit. The general aspect of the body undergoes a change by the long continuance of the malady; the countenance becomes pale, and of a dusky hue, the body is emaciated, and the legs and abdomen swell.

SEQUELÆ.—Hypertrophy of the heart. Fatty degeneration of the liver and kidneys. Anasarca and ascites.

PHYSICAL SIGNS.—Peculiarly clear sound on percussion, with indistinct respiratory murmur, and prolonged inspiratory and expiratory sounds; to which is sometimes added, a dry crepitous rhonchus, with occasional loud clicking sound, or a friction sound, similar to that of a finger rubbed on a table. The respiratory movements are indistinct, and the respiration is abdominal. In marked cases, the chest is enlarged and rounded in all directions; but when the emphysema is confined

to one lung, or to a part of one lung, the chest is irregularly enlarged. When complicated with bronchitis or other diseases of the lungs, the physical signs of those diseases are superadded.

ANATOMICAL CHARACTERS. — Enlargement of the air-cells, or rupture of the air-cells into each other, or into the subserous cellular membrane (interlobular emphysema). The lungs increased in volume.

DIAGNOSIS.—From asthma, by the permanent shortness of breath. But as emphysema is a common occurrence in chronic bronchitis, and is apt to supervene after repeated attacks of all the forms of asthma, this diagnostic mark does not admit of very frequent application.

PROGNOSIS.—The disease is not fatal in itself, but dangerous by laying the foundation for other diseases.

TREATMENT.—I. During the paroxysms. II. During the intervals.

I. *During the paroxysms.*—The fits may be greatly relieved by a combination of opium and diffusible stimulants. From 20 drops to ʒss. of laudanum, with from half a drachm to a drachm of æther, may be administered at the onset of the fit. The shoulders should be well raised, the doors and windows should be thrown open, at the same time that the body, and especially the lower extremities, are kept warm. In extreme cases, cupping between the shoulders, or the cautious abstraction of blood from the arm by a small orifice, may become necessary. When the patient has reason to apprehend an attack, an emetic, by emptying the stomach, and removing the existing flatulence, may prevent the paroxysm; and similar relief is sometimes afforded by promoting a free action of the bowels. Five grains of calomel and five grains of extract of colocynth, followed by a black draught, is a suitable purgative.

II. *During the intervals.*—The disease does not admit of cure. The treatment is partly that of the complications which may exist with it, and partly consists in a few simple precautions, such as the avoidance of colds by warm clothing and dry feet, the daily use of cold sponging or the shower-bath, regular and moderate meals, aloetic aperients, liquids in small quantity, and the avoidance of the causes of flatulence. If flatulence exist, a combination of alum, rhubarb, and ginger (ten grains of the first, three of the second, and five of the third), taken twice or thrice a-day, or a dinner-pill containing the same or similar ingredients, taken daily an hour before dinner.

Emphysematous patients suffer most in close moist weather, when the function of the skin is impeded; and least when the weather is open and the air dry and bracing.

PERTUSSIS—WHOOPING-COUGH.

SYNONYM.—Chin-cough.

DEFINITION.—A contagious and infectious malady, characterised by a peculiar cough occurring in paroxysms terminated by vomiting.

SYMPTOMS.—The disease generally sets in with the symptoms of a common cold, and it is not till the second or third week after the attack, and when the febrile symptoms have somewhat abated, that it assumes its peculiar and characteristic symptoms. The cough now comes on in distinct fits; each fit consisting in a series of violent and convulsive expirations with congestion of the face, and threatening of instant suffocation, and sometimes with involuntary discharge of the urine and fæces, followed by a sudden and full inspiration, accompanied by a peculiar whoop from which the disease has obtained its name. The convulsive coughing is renewed, and continues in the same manner as before, till a quantity of mucus is thrown up from the lungs, or the contents of the stomach are evacuated by vomiting, or the fluid issues from the mouth and nostrils mixed with blood, which generally terminates the fit; the patient has then most frequently an interval of perfect freedom from cough, and often expresses a desire for food; but when the attack has been severe, it is succeeded by much fatigue, hurried respiration, and general languor and debility. The disease generally attains its greatest severity at the end of the fourth or fifth week, after which the paroxysms become less severe, and at length, after a further variable period of from two weeks to four months, entirely cease. In some instances, however, the disease has been protracted for several months, and even for more than a year.

SEQUELÆ AND COMPLICATIONS.—Bronchitis. Pneumonia. Pleuritis. Gastritis. Phrenitis. Convulsions. Apoplexy. Epilepsy.

MORBID APPEARANCES.—Those of inflammation in the bronchial tubes, with large collection of mucus in the air-passages. Inflammation of the substance of the lungs. Inflamed bronchial glands. Inflammation of the mucous membrane of the stomach, and of the intestines, with enlargement of Peyer's and Brunner's glands. In other words, an inflamed condition of the parts supplied by the eighth pair of nerves.

CAUSES.—*Predisposing.* The period of childhood. Adults, however, are not wholly exempt. The seasons of spring and autumn. *Exciting.*—Specific contagion.

DIAGNOSIS.—When fully established, it is distinguished from every other disease by the convulsive cough, followed by the peculiar whoop above described; and by the fits terminating in vomiting or free expectoration.

PROGNOSIS.—*Favourable.* Moderate and free expectoration; the strength little impaired; the fits neither frequent nor violent; in the interval, the respiration free; the appetite good; the absence of fever; moderate hæmorrhage from the nose. *Unfavourable.*—The disease occurring in children under two years of age, and especially while suckling or teething; and in children born of phthisical or asthmatic parents. Complication with any of the diseases above mentioned.

LAWS OF INFECTION.—Propagated by contagion, by fomites, and through the air. Rarely attacks the same person twice. May coexist with small-pox, measles, and other febrile disorders; but is sometimes cured on their appearance. The infecting distance is believed to be considerable. Latent period, five or six days.

MORTALITY.—The deaths in the metropolis, during the last 15 years, in a million persons of all ages, have fluctuated between 582 and 1,217, the average being 857. Two diseases only (Typhus fever and Scarlatina) are more fatal to life.

TREATMENT.—*Indications.* I. To keep up a constant state of nausea, so that the fit may be more promptly finished by vomiting. II. To reduce existing inflammation of the lungs.

1. These two indications may be perfectly fulfilled in a large majority of cases by the same remedy—viz., tartar-emetic in doses sufficiently large to keep up a constant state of nausea. From a twelfth to a sixth of a grain, according to the age of the patient, may be given at short intervals, either alone, or in combination with a grain of hydrargyrum c. cretâ. The bowels must, at the same time, be kept free by gentle aperients, the diet must consist of bland farinaceous substances, and the patient must be carefully guarded from cold, and kept in a pure warm air. No other remedies are required; but when there is extreme restlessness, and the fits are accompanied by great distress, the tartar-emetic may be combined with opium, or the antimonial wine with laudanum. Half an ounce of antimonial wine with a drachm of laudanum, and distilled water in sufficient quantity to make a mixture of ℥iss, will form a very good combination. The dose may be a tea-spoonful once, twice, or thrice daily. When the mucus is brought up with difficulty, an emetic should be given once, twice, or thrice a-week. A warm bath may be given occasionally with advantage.

2. If there are signs of inflammation in the lungs, the tartar-emetic must be continued in increased doses; one or more leeches may be applied to the chest (the most convenient place is the upper bone of the sternum), followed, if necessary, by counter-irritants, hot water, or mustard poultices to the extremities; and, in fact, the treatment appropriate to pneumonia. If there is determination of blood to the head, leeches to the temples and cold applications. When the severity of the disease has passed away, change of air is the best restorative. This remedy is also sometimes of the greatest service in the very height of the disorder. Existing debility must be treated by tonics, of which the best are the preparations of steel.

REMEDIES.—Bleeding at the outset; emetics of tartarized antimony, ipecacuanha, or squills; nauseating remedies, such as tartar-emetic and ipecacuanha, with or without laudanum; sedatives, such as tincture or extract of hyoscyamus, or conium, syrup of poppies, extract of lettuce, or prussic acid, belladonna, digitalis; antispasmodics, such as musk, garlic, assafœtida, and camphor; cochineal, oil of amber, cantharides, cinchona bark, arsenic, sulphate of zinc, alum. Counter-irritants. To

most of these remedies the following observation of Dr. Bateman may be applied:—"Perhaps there is no disease for which so many *specifics* and infallible nostrums are promulgated with confidence, or so few actual remedies known."

BRONCHIAL POLYPI.

SYMPTOMS.—After slight hoarseness of the voice and dry cough, or without any premonitory symptoms, repeated expectoration of bright-coloured blood, in considerable quantities, attended with little or no dyspnœa, and no febrile symptoms. After an interval of time (sometimes of several days, or of two or three weeks), white casts of lymph, some hollow, some solid, branched so as to resemble the ramifications of the air-tubes, are found mingled with the blood. In some cases there is no hæmoptysis.

DIAGNOSIS.—This disease has generally occurred in robust, plethoric persons, in the enjoyment of good health, and free from any other symptom of phthisis pulmonalis, except the spitting of blood.

PROGNOSIS.—Favourable. The disease is very apt to recur.

PHYSICAL SIGNS.—Slight mucous râle: the absence of the physical signs and symptoms of phthisis, and of aneurism. The respiration in the greater part of the chest healthy.

TREATMENT.—If the general health does not suffer, and there is no dyspnœa, the treatment should be that of the more favourable cases of hæmoptysis. Active treatment is contraindicated. It will be sufficient to prescribe mild aperients, cooling medicines, the dilute mineral acids, in combination with sedatives, and a regulated diet.

DISEASES OF THE SUBSTANCE OF THE LUNGS.

PNEUMONIA	Inflammation of the Lungs.
GANGRÆNA PULMONUM .	Gangrene of the Lungs.
HÆMOPTYSIS	Spitting of Blood.
PHTHISIS PULMONALIS .	Pulmonary Consumption.

PNEUMONIA—INFLAMMATION OF THE SUBSTANCE OF THE LUNGS.

SYNONYMS.—Peripneumonia. Pulmonitis. Pneumonitis.

SYMPTOMS.—The disease sometimes sets in with rigors, followed by pyrexia; at others the local symptoms are the first to show themselves. There is high fever, with increased heat of surface, especially on the chest; flushed face; injection of the eyes; headache; frequent, quick, and compressible pulse; thirst; furred tongue; anorexia; and great debility. The symptoms referable to the chest itself are a diffused,

dull pain, deep-seated, rarely acute, unless the disease involves the pleura; a short and dry cough, accompanied at first with scanty mucous expectoration, but after the lapse of one or two days, with a rusty-coloured, viscid sputum; the respiration is frequent and short, rising from 13 or 14 (the probable number in the recumbent posture in health) to 30 and upwards.

In favourable cases, the disease may decline on the third or fourth day; more frequently it is protracted to ten days or a fortnight. In unfavourable cases the symptoms increase on the third or fourth day; the respiration becomes more and more frequent; the sputa of a deeper hue, of a more viscid consistence, and often streaked with blood; the pulse increases in frequency and feebleness; the tongue is dry and covered with a brown fur; the skin hot and pungent to the touch; the debility extreme; delirium and coma come on, with all the symptoms of typhoid fever. In the last stage, the expectoration loses its viscid character, and becomes a thin reddish-brown fluid; the dyspnœa increases; the pulse is small and fluttering; the countenance pallid; the lips livid; the skin covered with a clammy sweat; there is an increasing rattle in the throat; and at length the patient dies exhausted, asphyxiated, or comatose. In favourable cases the symptoms gradually subside, and the sputa become less viscid and more abundant, and of a purulent or muco-purulent character.

Anatomical Characters.—Corresponding to the first stage of the disease, *sanguineous congestion*; to the second, *red hepatisation*; to the third, *yellow hepatisation* or *diffused suppuration*.

Physical Signs.—At the onset, puerile respiration; when the disease is fairly established, and during the stage of congestion, *crepitant rhonchus*; in the stage of hepatisation, absence of respiratory murmur, with bronchial respiration, and bronchophony; in the third stage (that of suppuration), *mucous rhonchus*. Throughout the disease, dulness on percussion, which is most marked during the stage of hepatisation. The parts most commonly affected are the lower lobes of one or both lungs; and the physical signs are most strongly marked at the lateral and posterior parts of the chest. When pneumonia terminates in abscess (vomica), the physical signs are those of tuberculous excavations (see Phthisis Pulmonalis).

Varieties and Complications.—Pneumonia may supervene on typhus, small-pox, measles, erysipelas, and scarlatina; when it is often obscure and liable to be overlooked. Great heat of chest, unusual dyspnœa, and sudden aggravation of the symptoms, should lead the practitioner to suspect this complication. The physical signs are nearly the same as in idiopathic pneumonia. It is also apt to attack patients labouring under phthisis, is a frequent concomitant of bronchitis, and comes on occasionally after severe injuries and surgical operations. Sometimes it is combined with pleurisy (pleuro-pneumonia).

Causes.—*Remote and predisposing.* Sanguineous temperament, vigorous and plethoric habit, winter and spring seasons, a peculiar

state of the atmosphere. Great debility and privation in the poorer inhabitants of large towns. *Exciting.*—The common causes of inflammation; vicissitudes of temperature, violent exercise of the body, or exertions of the voice; congestion occurring from common causes, or in the course of various febrile diseases; other affections of the lungs, especially tubercular deposits; diseases of the heart.

DIAGNOSIS.—By the peculiar rusty tinge of the sputa, the crepitant rhonchus, and the pungent heat of the surface of the chest. The history of the case will distinguish idiopathic pneumonia from typhus fever with chest complication.

PROGNOSIS.—*Favourable.* An early and copious mucous expectoration, the small crepitation changing to the distinct mucous râle; later in the disease, an abundant muco-purulent expectoration, with return of resonance of chest and respiratory murmur; hæmorrhage from the nose; warm, equable, and free diaphoresis; diarrhœa; inflammation on an external part; a sediment in the urine; diminished frequency of respiration is an extremely favourable symptom; the absence of complication; the disease being of limited extent.

Unfavourable.—The duration of the disease beyond the fourteenth day; violent fever and delirium, or typhoid symptoms, with low delirium or coma; great drowsiness; no expectoration, or the expectorated matter tinged with blood, or of a dark or black colour; sudden cessation of pain, followed by a change of countenance, and a sinking or irregularity of the pulse; increasing frequency of respiration; a previously-broken constitution; complications; the disease extending to the whole lung or to both lungs; occurring in very young children, or in the aged and debilitated.

TREATMENT.—This must vary with the stage of the disease. *During the first stage*, or that of congestion, and in plethoric and vigorous subjects, living in the country, blood may be taken from the arm, the bleeding to be followed by a brisk aperient, and by tartar-emetic, in half-grain doses, at intervals of one or two hours. The quantity may be increased to a grain, or even more, and it may be advantageously combined with calomel. Half a grain of tartar-emetic, with two of calomel, may be given every one or two hours. This combination, in doses proportioned to the age, may also be given in the pneumonia of infants. In less vigorous subjects, local depletion by leeches or cupping will suffice, and in weakly persons, counter-irritants, without general or local abstraction of blood. As a general rule, bleeding is contra-indicated in the inhabitants of large towns, and still more in persons addicted to intemperance. In such persons a stimulant plan may be advantageously adopted from the first. (A table-spoonful of the liq. ammoniæ acetatis every three or four hours.)

In the second stage, or that of hepatisation, local bleeding, by cupping or leeches, with counter-irritation, must be substituted when necessary for general bleeding, and calomel and opium given frequently, so as to affect the gums, for the tartar-emetic. If, however, there is

high fever, the tartar-emetic may still be continued in combination with the calomel; but if typhoid symptoms have already supervened, stimulants are called for. Of these, the best is ammonia, in combination with camphor.

In the third stage, or that of suppuration, stimulants will be required, such as ammonia, æther, and wine; if the fetid character of the sputa announces the presence of gangrene, still stronger stimulants will be necessary, combined with full doses of opium.

The foregoing remedies must be employed with due regard to the severity of the local disease, as well as of the general symptoms. When bleeding is employed, its effects should be carefully watched. Debility, in the absence of marked typhoid symptoms, does not counter-indicate it; and if the pulse rises under its use, it may be continued with advantage. The diet must be strictly antiphlogistic in the first stage; nourishing and stimulant if typhoid symptoms supervene; nourishing, but not stimulating, during convalescence. The patient's room should be of a moderate and equable temperature (about 60°); the head should be raised as much as the patient's strength will allow, and the posture should be changed from time to time.

If a chronic form of pneumonia continues after the severe symptoms have been removed, a course of mercury so as slightly to affect the system, counter-irritation, the hydriodate of potash with sarsaparilla, or Plummer's pill, with change of air, regular exercise, and temperate diet, may be resorted to. The patient requires to be closely watched, and the chest should be examined from time to time.

GANGRÆNA PULMONUM—GANGRENE OF THE LUNGS.

VARIETIES.—1. Diffused. 2. Circumscribed.

SYMPTOMS.—Extreme prostration of strength; a frequent, feeble pulse; expectoration of dingy-green sputa, mixed with blood, and of a peculiarly offensive odour; mucous rhonchus; marked typhoid symptoms; and death from exhaustion.

CAUSES.—Pneumonia occurring in extremely feeble constitutions. Pulmonary apoplexy occasioned by pressure on the pulmonary veins. (See a Clinical Lecture by Dr. Todd in Med. Times and Gazette, Jan. 13, 1855.)

DIAGNOSIS.—The peculiar colour and offensive odour of the sputa.

PROGNOSIS.—Highly unfavourable, especially when the disease involves a large portion of the lungs. About an eighth of the cases terminate favourably.

TREATMENT.—Strong stimulants and opium in full doses. (℞. Ammon. sesquicarb. gr. x. Tinct. Opii ♏ xx. or ♏ xxx.) This may be given, in camphor mixture, every three or four hours, the effect of the opium being carefully watched, with a liberal allowance of wine or spirits, and a nutritious diet.

HÆMOPTYSIS—SPITTING OF BLOOD.

SYMPTOMS.—Spitting of blood is often preceded by a sense of weight and oppression in the chest, or of uneasiness in some one spot, with slight febrile symptoms, a frequent, sharp, and compressible pulse, some difficulty of breathing, and a dry tickling cough. In some cases the mouth constantly fills with blood, without cough or irritation of the throat; but in other cases the blood is brought up alone, or mixed with mucus, after long fits of coughing. The patient usually complains of a salt taste in the mouth.

PHYSICAL SIGNS.—The chest sometimes affords the natural sound on percussion, and there is slight mucous râle; at other times there is dulness on percussion over a limited spot, surrounded by crepitant rhonchus. In the former case, the hæmorrhage is from the bronchial tubes (bronchial hæmorrhage); in the latter, blood is effused into the substance of the lungs (pulmonary apoplexy). In a third class of cases the spitting of blood occurs as a symptom of confirmed phthisis, and the stethoscopic signs are those of a cavity in the lungs.

CAUSES.—*Predisposing.* A certain age—from the period of puberty to the forty-fifth year; sanguineous temperament; plethora; narrow conformation of the chest; previous attacks of the same disease. *Exciting.*—Excessive heat of the atmosphere; violent exercise; the lifting of heavy weights; inordinate exertion of the organs of respiration, as in public speaking, singing, &c.; external violence.

The most common cause of hæmoptysis is the existence of tubercular matter in the lungs, the hæmoptysis in some cases preceding, in others following, the appearance of the other symptoms of pulmonary consumption. The next in point of frequency is vicarious hæmoptysis, the consequence of amenorrhœa. Less frequent still is hæmoptysis dependent on disease of the heart, or rupture of an aneurism. Least frequent of all is hæmorrhage, accompanied by the formation of so-called bronchial polypi. Hæmoptysis may also occur in congestion of the lungs, however produced, as in pneumonia; in the fit of congestive asthma; in gangrene of the lungs; and with hæmorrhage from other organs, in purpura hæmorrhagica, and purpura nautica.

DIAGNOSIS.—The blood is brought up by coughing, generally in small quantities, or mouthfuls at a time, of a florid red colour, and preceded by, or mixed with, a little frothy mucus. An abundant sudden discharge of *florid* blood would alone lead us to regard the hæmorrhage as coming directly from the lungs, being poured out either by its own vessels, or in consequence of the rupture of an artery communicating with the air-passages.

From *hæmatemesis.*—The blood thrown up in hæmatemesis is usually in much larger quantity, of a darker colour, more grumous, mixed with food, and usually unattended with cough. From *hæmorrhage from the nose, fauces,* or *gums.*—By careful examination of those parts, and the history of the case.

PROGNOSIS.—As regards the disease itself, the prognosis is generally favourable, when the hæmorrhage is not in very large quantity, suddenly poured out. It is also favourable when taking the place of the menses in amenorrhœa. In most other cases in both sexes its occurrence must excite suspicion of the existence of tubercles: in the ascertained absence of tubercles, there would be reason to fear disease of the heart. When the hæmoptysis is preceded or followed by the expectoration of bronchial polypi, the prognosis is also favourable.

TREATMENT.—*Indications.* I. To remove congestion where that exists. II. To keep the circulation quiet. III. To restore the relaxed vessels to their healthy condition..

I. The first indication is best fulfilled by bleeding from the arm. The circumstances which justify the adoption of this remedy are plethora, a full, frequent, and jerking pulse, great dyspnœa, a flushed countenance, and abundant hæmorrhage. When the countenance and skin are pale, the pulse small and weak, and the respiration little affected, bleeding is not required. Bleeding is also contraindicated when hæmoptysis occurs in the course of an attack of phthisis. Leeches or cupping may be substituted for general bleeding when the abstraction of blood is less urgently required.

II. Low diet, perfect repose, fresh cool air, cold liquids, or ice taken internally and applied externally, with gentle aperients, will fulfil the second indication. The head of the patient should be raised, and he should be forbidden to speak, except in a whisper, and then as little as possible. If after bleeding there is still some febrile action, tartar-emetic, in doses of from one-eighth to one-fourth of a grain, may be given every three or four hours.

III. After existing congestion or febrile symptoms have been removed, or in cases where there has been from the first no congestion or fever, the third indication will be fulfilled by remedies belonging to the class of astringents, such as dilute sulphuric acid, in doses of twenty drops, or the acetate of lead, in doses of from five or six to fifteen grains daily, given with an excess of acetic acid, and combined with tincture of opium or hyoscyamus, and tincture of digitalis. Twenty drops of dilute sulphuric acid, with five of laudanum and ten of digitalis, three or four times a-day, may be given with advantage; or the acetate of lead, and acetic acid, may be substituted for the dilute sulphuric acid.

REMEDIES.—Nitrate of potass, in full doses: ipecacuanha (two grains every quarter or half hour, till the hæmorrhage ceases); the same in combination with opium; the ergot of rye; Ruspini's styptic (an alcoholic solution of gallic acid); mercury; tannin, in doses of five grains, three or four times a-day.

PHTHISIS PULMONALIS—PULMONARY CONSUMPTION.

DEFINITION.—Tubercular deposit in the lungs, giving rise to suppuration and hectic fever.

SYMPTOMS.—The disease usually begins with a short dry cough, occurring, for the most part, on first rising in the morning, and so slight as to become habitual before it excites the attention of the patient. It is sometimes accompanied by slight dyspnœa, increased on exertion, and the patient generally loses flesh, is soon fatigued, and easily thrown into a perspiration; or he complains of unusual coldness of the trunk and extremities. Slight dyspeptic symptoms, diarrhœa, frontal headache, and a small, frequent, quick pulse, are also among the early symptoms; and, on inquiry, the patient will often recollect that he formerly spat blood.

After these symptoms have continued for a variable period of several weeks, months, or even years, in consequence of a cold, or some trivial exciting cause, the cough becomes more constant and troublesome, and is attended by expectoration, at first of a frothy mucus, afterwards of a more viscid and opaque sputum, often mixed with small round particles of tubercular matter, with pus, or with streaks of blood; or hæmoptysis occurs in a more marked form, and to a greater extent. The dyspnœa increases, there are shooting pains in the chest, or cutaneous tenderness, and a peculiar hoarseness of the voice is present in a certain proportion of the cases.

As the disease advances, the cough and dyspnœa become more urgent, the expectoration more abundant, the emaciation and weakness more considerable, the pulse more frequent; there are chills at noon or in the afternoon; the face flushes towards evening, the palms of the hands and soles of the feet are affected with burning heat; in a word, hectic fever sets in, followed towards morning by profuse perspiration. The urine is high-coloured, and deposits a pink sediment. The tongue, from being white, is now preternaturally clean and red, and the appetite often improves. Profuse diarrhœa, sometimes tinged with blood, colliquative sweats, extreme emaciation, the falling off of the hair, œdema of the legs, aphthæ in the mouth and throat, hectic fever in its most marked form, and a very feeble, rapid, and often irregular pulse, usher in the fatal termination. In some cases the patient dies suffocated, having escaped many of the most distressing symptoms. The appetite often remains good to the last, and the patient flatters himself with the hopes of speedy recovery, and is often forming distant projects of interest or amusement, when death puts a period to his existence.

ANATOMICAL CHARACTERS.—In the lungs, tubercular matter, in the form of miliary tubercles or granulations scattered through the lungs; or of opaque yellowish-white masses infiltrated into their texture. Cavities of various size and shape, sometimes found in every part of the lung, but generally confined to the upper lobes, larger and more numerous on the right than on the left side. In the larynx and trachea, ulcerations (in the larynx in one-fifth of his cases, in the

trachea in one-third—Louis). In the intestines, also, ulcerations (in five-sixths of Louis' cases). The liver enlarged, and changed in appearance and consistence (the fatty or nutmeg liver). Tubercular deposits in various organs of the body.

PHYSICAL SIGNS.—In the incipient stage, before suppuration sets in, dulness on percussion over the clavicles and in the supra and infra clavicular regions, on both sides, but generally greater on the right than on the left side. Similar dulness between the scapulæ. The upper part of the chest, in some instances, is obviously contracted, the clavicles being very prominent, the supra-clavicular regions deeply hollowed, the anterior and upper part of the chest flattened, and the shoulders thrust prominently forward. The stethoscopic indications are a roughness in the respiratory murmur; a prolonged expiratory sound; bronchial respiration, heard more distinctly on one side than the other, and most to be depended on as a sign of incipient phthisis when heard towards the point of the shoulder; mucous, sub-mucous, and sibilant rhonchus; a slight click; slight crepitant rhonchus; increased resonance of the voice; in some cases, extremely indistinct respiratory murmur. The beat of the heart is peculiarly distinct over the entire chest.

In *confirmed* phthisis, one or more of the following physical signs are superadded to the foregoing:—more distinct click or bubbling sound, which is most distinctly heard when the patient coughs or takes a full inspiration; cavernous rhonchus; cavernous respiration; pectoriloquy; amphoric resonance; metallic tinkling; distinct gurgling when the patient coughs; and, in rare cases, equally distinct sound of fluid in motion on succussion. The cracked-metal sound, on sharp percussion. The situation in which these sounds occur, and the limited space which they occupy, will generally serve to distinguish phthisis from other conditions of lung productive of the same or similar sounds.

The sputa are at first frothy, as in bronchitis; then mucous, then flocculent, resembling "irregular balls of flock or wool, of a yellow or greenish colour, sinking and breaking down in water;" and lastly purulent, often sinking in water, and sometimes containing particles of clotted matter, like softened cheese. The sputa are often streaked or spotted with blood; sometimes they are discharged in masses which the patient compares to "oysters," and which are also designated as "nummular sputa." In rare instances, distinct portions of pulmonary tissue are spit up, having under the microscope the appearance depicted in Fig. 45, p. 223. The frothy and mucous forms of expectoration attend the early stages of phthisis, the flocculent and purulent the more advanced stages.

COMPLICATIONS.—Bronchitis, pneumonia, and pleurisy, followed by adhesions or by pneumothorax. Ulceration of the larynx and trachea. Extensive disease of the liver; *inflammation of the peritoneum; œdema of the* ankles, anasarca, ascites; *ulceration of the intestines; fistula in ano;* mania.

DURATION.—The average is about two years. In acute cases, from a few months to one or two years. In very acute cases, three weeks or a month. In chronic cases, death often takes place after the lapse of years, and after repeated attacks.

CAUSES.—*Predisposing.* Hereditary predisposition (in about one-fourth of the cases); the scrofulous diathesis; adult age. The male sex? A particular formation of the body, marked by a long neck, prominent shoulders, narrow or deformed chest, long slender fingers, with filbert nails, regular white teeth, and gums with a deep red margin; thin upper lip; a fine clear skin, delicate complexion, fine hair, varying from light to dark chestnut, light blue or gray eye, with large pupil and long eyelash; or the black hair, dark eye, and sallow complexion. Sedentary life; a close and confined atmosphere; insufficient and unwholesome food; depressing passions of the mind; dissipation and intemperance; profuse evacuations; and all causes of debility. *Exciting.*—Foregone attacks of pneumonia, catarrh, asthma, scrofula, syphilis, variola, rubeola. The dust to which certain artificers are exposed, as needle-pointers, stone-cutters, pearl-button makers, millers, &c. Irritating fumes. In Italy, and by a few medical men in our own country, pulmonary consumption is believed to be contagious. The opinion, however, rests on very slender grounds; and the strongest argument in favour of it, namely the occasional death by consumption of husband and wife, loses its force when it is borne in mind that in the case of a disease which destroys so large a fraction of the whole adult population, such coincidences must not unfrequently occur.

MORTALITY.—The disease is ultimately fatal (but often after several attacks) in the vast majority of cases. It destroys about a ninth part of the English population, and about a fifth part of those who attain the adult age. In the metropolis it causes about a seventh of the deaths at all ages, and about a fourth of the deaths of adults.

DIAGNOSIS.—The symptoms and physical signs taken together, render the diagnosis of confirmed phthisis easy, but it is often difficult in the incipient stage, and in cases of complication with other chest affections. The following observations may facilitate the diagnosis. The first onset of phthisis is marked by very slight and very variable symptoms. One patient complains merely of debility; a second, of debility and slight emaciation, for which he can assign no cause; a third, of distressing perspiration on slight exertion; a fourth, of constant pain in the forehead; a fifth, of dyspepsia; a sixth, of muscular pains; a seventh, of diarrhœa; an eighth, of hæmoptysis; a ninth, of slight hacking cough, with scanty mucous expectoration in the morning; a tenth, of palpitation. Another patient has been subject to winter cough, or what he terms asthma, for years, but never suffered so much in previous winters: his cough, for the first time, continues throughout the summer months. A few well-directed

inquiries will generally bring to light some additional symptom actually existing, or present at some former period; but, in spite of the most careful inquiry, the case will often remain obscure, and the physician will be tempted to stop at the most obvious symptom, and to direct his treatment to its removal; unsuspicious of the lurking disease which is its cause. In all these obscure cases, the character of the pulse is especially deserving of attention, as it affords indications quite as valuable as those obtained by an examination of the chest.

The Pulse in some cases excites suspicion, in others confirms it, by 1, increased frequency; 2, diminished volume; 3, increased quickness or sharpness; or 4, by all three combined.

1. In five out of six cases the number of the pulse in phthisis exceeds the highest number (92) observed in *apparently* healthy males of the same mean age; while in the great majority of instances it exceeds the average. Sometimes this increased frequency of pulse accompanies the first feelings of indisposition, and continues throughout the whole duration of the disease. I have known it as high as 140, where debility was the only marked symptom. On the other hand, cases do occur, though very rarely, in which the pulse is even less frequent than the average in health. [Jan. 1853.—P. D. aged 34, a policeman. When 24 years of age he had an attack of pneumonia, which confined him to bed for six weeks. During the attack he spat half a pint of blood mixed with yellow sputa, for several days in succession. When 26 years of age, he had an attack of pleurisy, for which he was bled. During the two years that he has been in the police force he has always had a cough, and when aged 33, again spat a little blood. Spits large quantities of yellow sputa, but no blood at present. There is dulness on percussion above and below both clavicles, with cavernous respiration, increased expiratory murmur, and pectoriloquy above the right clavicle; increased expiratory murmur and slight crepitus above the left clavicle. Pulse, standing, 64. He is still able to follow his employment. August, 1853.—External appearance and symptoms little changed, but the pulse now above 100, in the same posture. June 1858.—Still in delicate health, but following his employment as a beadle.] 2. The diminished volume of the pulse is an almost constant character, and is present even in such exceptional cases as the above. 3. The quickness of the pulse—that is to say, the promptitude with which each separate pulse rises beneath the finger—is also even more constant than the increase of frequency, and may exist with a pulse of 70. The pulse of health is exactly the reverse of this, rising slowly, and, as it were, deliberately, beneath the finger; so also is the infrequent pulse of mere debility. To quickness is superadded smallness of pulse in phthisis, whilst the pulse in health is of moderate fulness. 4. The combination of the three characters of pulse—the frequency, the smallness, and the quickness—should always lead to an examination of the chest; but the small quick pulse alone is *sufficient ground of* suspicion. These observations apply only to *men, as the characters* here pointed out form a striking contrast to

those of the male pulse both in health and disease; while, on the contrary, the pulse of the female, even in health, possesses these three characters in a marked degree, and assumes them in most functional and in many organic diseases. A small, quick, and frequent pulse is, therefore, less indicative of consumption in women than in men. The slight effect produced by a change from the erect to the sitting posture will also assist the diagnosis in the male, by distinguishing the debility of phthisis from simple debility due to other causes. Whenever, then, a man presents himself for advice, complaining of debility, or of other obscure symptoms of phthisis, or even of symptoms proper to functional diseases of other organs, and is at the same time obviously free from acute disease, the pulse should be examined, and if, after allowing the patient's agitation to subside, the pulse is either very small and frequent, or very small and quick, or if it combine all these characters of increased frequency, smallness, and quickness, the chest should be examined, and in by far the majority of cases the physical signs will be found to justify the suspicion raised by the pulse. In examining persons offering themselves for assurance, the state of the pulse should be particularly attended to. It may be well to observe that, in consequence of the quickness of the pulse (the promptitude with which each beat is performed), the pulse usually seems much less frequent than it is. It should, therefore, be always counted by the watch. (G.)

Headache.—Another symptom often present, and already cursorily alluded to, is headache,—pain in the forehead and over the eyes.—This symptom, too, has often led me to examine the chest, and in the majority of instances with the result of confirming my suspicions. (G.)

Palpitation.—This also is often the very first symptom which engages the patient's attention. (G.)

PROGNOSIS.—*Unfavourable*, as to the ultimate event, but guarded as to the event of an existing attack, for the patient may survive three, four, or more severe attacks in succession. An existing attack is likely to terminate fatally when there is a high degree of hectic fever; great frequency of pulse and respiration; great emaciation and debility; a morbidly-clean or fiery-red tongue; fixed pain in the chest; colliquative sweats or diarrhœa; profuse purulent expectoration; œdema of the legs; aphthæ; and stethoscopic indications of extensive and advanced disease, or of the supervention of pneumonia or pleuritis.

There is a better prospect of a favourable result to an existing attack when the disease is limited in extent, and not traceable to hereditary predisposition; when there is little loss of strength and flesh; when the pulse and respiration are but little increased in frequency; when there are no night-sweats, no diarrhœa, and no complications. When the disease is very limited, ultimate recovery is a possible, though very rare, event. In females, the first attack is more generally fatal than in males.

TREATMENT.—I. Of incipient phthisis. II. Of confirmed phthisis.

I. In *incipient* phthisis, the indications are—(*a.*) To promote the absorption of the tubercular matter; (*b.*) To prevent or subdue local inflammation; (*c.*) To improve the general health.

(*a.*) With a view to promote the absorption of tubercle, two remedies have been recommended—viz., mercury and iodine; the first to be given so as slightly to affect the system; the second, in the form of iodide of potassium or of iron. Iodine may also be inhaled with the steam of warm water. There is no sufficient reason for believing that these or any other remedies possess any power of removing tubercular deposits; and a course of mercury is to be deprecated.

(*b.*) Local inflammation may be prevented by guarding against cold and all those causes which excite the circulation. Warm clothing; the avoidance of exposure to wet and cold; a milk diet, or a diet consisting chiefly or entirely of vegetable food, to the total exclusion of all stimulants; and a proper attention to the state of all the secretions, will fulfil the first part of this indication. Inflammation, where it already exists, may be subdued by small bleedings repeated at intervals of a few days or a week; by leeches applied over the site of the tubercular deposits; by counter-irritants to the upper parts of the chest, of which the tartar-emetic ointment is the best, and, in certain cases, by small doses of tartar-emetic.

(*c.*) The general health may be improved by proper exercise, wholesome diet, regular habits, pure air, change of air, especially to the seaside, sea voyages, cold sponging followed by friction every morning, and all the means in common use for this purpose.

II. In *confirmed* phthisis—that is to say, where suppuration has already taken place, the indications are—(*a.*) To facilitate expectoration; (*b.*) To subdue local inflammation; (*c.*) To mitigate distressing symptoms; (*d.*) To support the patient's strength.

(*a.*) The first indication is fulfilled by emetics. These remedies, however, are not admissible, nor are they of use, in the advanced stages of the disease. When the patient's strength is little impaired, and the expectoration is abundant, they may be given with the best effect. A scruple of sulphate of zinc should be taken on first rising in the morning, every day, or on alternate days, or once or twice in the week, according to the strength of the patient, and be followed up by a moderate quantity of warm water or warm camomile-tea.

I am inclined to restrict the use of emetics to those cases in which there is abundant expectoration. In incipient phthisis, attended with a dry cough, or scanty expectoration, emetics are as useless as they might *à priori* be expected to be. (G.)

(*b.*) Local inflammation must be combated by the occasional application of a few leeches over the part affected, and by the use of the tartar-emetic ointment.

(*c.*) The most distressing symptoms are night-sweats, cough, febrile flushes, palpitations, sickness, diarrhœa, and hæmoptysis. The palpitation may be relieved by digitalis, in doses of from five to ten drops of the tincture; the cough, by small doses of opium, by the compound

squill pill, in combination with the extract of conium, or by small and repeated doses of the more powerful sedatives. Of these, the best is extract of stramonium, in the dose of the sixth of a grain made into the form of lozenge with extract of liquorice, and sucked frequently in the course of the day and night when the cough is most urgent. A linctus containing chloric æther (ten drops to a dose) may also be given with advantage. The *febrile flushes* are relieved by cold sponging and cooling drinks. The *night-sweats* often subside under the use of the dilute sulphuric acid, in the dose of twenty drops. This may be combined, when there is much restlessness, with a quarter of a grain of morphia. The distressing *sickness* which sometimes accompanies phthisis, requires the use of dilute hydrocyanic acid, in the dose of three or four drops three times a-day, with a bland farinaceous diet. *Diarrhœa* commonly subsides by strict regulation of the diet, and the prohibition of every form of solid food. If this should not suffice, the common remedies for diarrhœa must be employed. That which answers best, is a combination of a sixth or a fourth of a grain of sulphate of copper with the same quantity of opium. In *hæmoptysis*, the dilute mineral acids (Acidi sulphurici dil. ♏ xx.), or, if these fail, the acetate of lead with an excess of acetic acid, and small doses of opium and digitalis (℞ plumbi acetat. gr. v. Acidi acetici f. ʒi. Tinct. opii ♏ v. Tinct. digit. ♏ x. Aquæ f. ℥i.)

(*d.*) The patient's strength will be best supported by nourishing diet, without stimulants. In the last stage of the disease, however, stimulants, such as wine and ammonia, may be administered with advantage.

Remedies.—Cod-liver oil, in doses of a dessert or table spoonful, three or four times a-day, especially in cases of incipient phthisis. Neat's-foot oil. Glycerine. Cod-liver, or neat's-foot, oil rubbed into the skin of the chest, when the stomach rejects the oil. The inhalation of æther, conium, tobacco, stramonium, digitalis, iodine, and chlorine, hydrogen and hydro-carbon, and the vapours of tar. Digitalis and hydrocyanic acid; quinine; and chalybeates. Naphtha! The Iceland or Irish moss. Change of air; a sea voyage. Uniform temperature! A residence at Undercliff in the Isle of Wight, Torquay, Hastings, and Cork; Rome, Nice, Malaga, Egypt, the Cape, Madeira, the West Indies, the East Indies.

In incipient phthisis, it is obvious that a sea voyage, or a change of air and scene, or a change from a low damp spot to a dry bracing air, would be as useful as to any other person whose health had suffered impairment from whatever cause. This is probably the extent to which change of climate is beneficial in the early stage of phthisis. As, however, it has lately been shown that, in the East Indies, there is among our troops, as well as among the natives, a remarkable immunity from consumption, a residence in that climate may be reasonably recommended, both to persons labouring under the incipient disease, and to families deeply tainted with scrofula.* The

* I leave this passage unaltered, though some facts which have recently come under my notice lead me to speak with more hesitation upon this point. (G.)

places now usually recommended have not this probability in their favour, and the evidence in support of the change is on a level with that in favour of tar-water, naphtha, frictions to the spine, or dry-cupping to the chest. The fact is, that everything that has ever been recommended, however trivial, has seemed to effect a cure, simply because patients labouring under phthisis do continually recover from existing attacks, and in rare instances regain perfect health, though pent up in towns, breathing the foul air of crowded workshops, living in unhealthy habitations, and surrounded by every unwholesome influence; exposed, in a word, to the continued action of the predisposing and exciting causes of the disease; while, on the other hand, many cases stated to be phthisis are merely sympathetic functional disorders of the lungs, or real diseases of the lungs of a non-tubercular origin. To recommend a change of climate in advanced stages of consumption is as unwise as it is cruel. But in incipient cases, a change may be fairly recommended, if it do not entail great inconvenience. But in all cases it is a choice of evils, which ought to be fairly stated. The benefit is not sufficient to counterbalance a great amount of inconvenience or a large pecuniary sacrifice. This moderate estimate of the beneficial effect of change of climate is founded upon facts and reasonings which the narrow limits of this work do not permit to be stated. (G.)

PROPHYLAXIS.—Persons who have an hereditary predisposition to phthisis, those who have habitually delicate health, or whose chests, on examination, prove to be unsound, require unusually careful management of their health. During childhood, nourishing and wholesome food, proper exercise, warm clothing, frequent ablution of the skin, pure air within doors, both in day and sleeping rooms, moderate application of the mind, and careful attention to the state of the bowels, are necessary. During youth and manhood such exercises as tend to expand the chest, especially fencing for men, and archery for women; exercise in the open air, especially horse exercise; sponging the chest every morning with cold water, followed by friction; the moderate employment of the voice in singing or in reading aloud; and careful avoidance of all excesses, bodily or mental, should be insisted on. All unwholesome employments and all sedentary occupations should be avoided. If a choice of a foreign country is to be made, the East Indies is, in all probability, the best.

DISEASES OF THE PLEURA.

PLEURITIS . . . Inflammation of the pleura.
PNEUMOTHORAX . . Air in the chest.
HYDROTHORAX . . Water in the chest.

PLEURITIS—INFLAMMATION OF THE PLEURA.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE PLEURISY.

SYMPTOMS.—After rigors, and the usual symptoms of inflammatory fever, a sense of weight in the chest, which in a few hours becomes acute pain, referred to the side, about the level of the nipple, thence shooting to the sternum, clavicle, or arm-pit, and in rare cases over the whole of the affected side. There is a short dry cough, unless the disease is complicated with bronchitis, pneumonia, or phthisis: in which case, the patient expectorates sputa characteristic of those diseases. The countenance is expressive of anxiety; the breathing is short and catching, and performed chiefly by the abdomen; the pain is increased by deep inspiration, by the act of coughing, or by lying on the affected side. The pulse is frequent, hard, and contracted, vibrating under the finger like the tense string of a musical instrument. The tongue is covered with a white fur; the urine is scanty and high-coloured; the skin hot, and the cheeks flushed.

Sometimes severe and extensive inflammation of the pleura occurs without these well-marked characters. The pain is more diffuse, less severe, or produced only by pressure between the ribs of the affected side; and in some instances it is altogether absent. In most cases the acute pain, as well as the fever, subside on the third or fourth day, and the cough and dyspnœa abate, though the pleura is still in a state of inflammation.

TERMINATIONS.—In resolution; in adhesion; in effusion; in the chronic form.

ANATOMICAL CHARACTERS.—Injection of the subserous cellular membrane with dryness of the surface of the pleura; effusion of coagulable lymph, or of pus mixed with flakes of lymph; and recent adhesions.

PHYSICAL SIGNS.—When the disease is recent, the effusion scanty, and the surface of the pleura not adherent, there are feeble respiratory murmur from diminished motion of the chest, dulness on striking the pleximeter lightly and quickly with the fingers, friction-sounds accompanying the movements of respiration, cessation of vocal fremitus, and ægophony. If adhesion takes place, the friction-sounds cease; and if effusion occurs to a considerable extent, the physical sounds are those stated under Empyema. (See Empyema.)

CAUSES.—*Predisposing.* Those of other internal inflammations. *Exciting.*—Cold; external injuries, fractures of the ribs, &c.; febrile states of the system; inflammation of the adjoining textures; tubercles in the lung.

DIAGNOSIS.—From *pleurodyne*, by the presence of severe constitutional symptoms, and of the characteristic physical signs. From other diseases of the chest, by the appropriate physical signs.

PROGNOSIS.—*Favourable.* A recent attack promptly treated; absence of complications; if the disease is not recent, the absence of hectic, and of great debility. *Unfavourable.*—Rapid and extensive effusion; the disease existing on both sides of the chest; the coexistence of organic disease; hectic fever and great debility; dropsical ffusion.

TREATMENT.—*Indication.* To reduce the local inflammation and prevent effusion.

This indication is fulfilled by a full bleeding from the arm to the approach of syncope, and the entire relief of the pain and breathing, followed immediately by full doses (from a quarter to half a grain, or even more,) of tartar-emetic, every one, two, or three hours, brisk aperients, and a strict antiphlogistic diet. The bleeding will rarely require to be repeated; but if the symptoms indicate it, it should not be delayed. It is of little use after the first few days. For slighter degrees of inflammation, cupping and leeches may be prescribed. The tartar-emetic may be usefully combined with calomel. The one keeps up the effect of the bleeding, until the other, slightly affecting the system, entirely puts a stop to the inflammatory tendency.

2. CHRONIC PLEURISY.

SYMPTOMS.—Chronic pleurisy is generally a consequence of the acute form, but it occasionally begins as a subacute disease. In either case, hectic fever, a permanently accelerated pulse, emaciation, dyspnœa increased by exertion, and inability to lie on the healthy side, are the principal symptoms. These are apt to alternate with symptoms of the more acute form, such as severe pain, and increased hardness of the pulse.

ANATOMICAL CHARACTERS.—Effusions of various kinds in the sac of the pleura; coagulable lymph thrown out on the surface of the membrane, and in various stages of organization; recent adhesions.

TREATMENT.—*Indications.* I. To promote the absorption of the effused matter. II. To support the patient's strength.

I. The first indication may be fulfilled by mercury, carried to the extent of affecting the system, or by the continued administration of the iodide of potassium, aided by such local measures of depletion or counter-irritation as may be necessary to prevent the re-establishment of inflammation.

II. The general strength may be supported by the cautious use of

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These measures will often lead to the absorption of the effused matter; but where this is very considerable, and especially when it consists chiefly or wholly of purulent matter, absorption rarely takes place, and the disease now takes the name of *empyema*.

EMPYEMA.

This term is applied to a collection of pus in the cavity of the pleura; but the meaning may be extended, without impropriety, to any collection of fluid following pleurisy. The general symptoms are those of chronic pleurisy; and the physical signs those of effusion of liquid, whatever may be its nature. When the effusion is purulent, ulceration is apt to occur in some of the surrounding textures, and an opening is formed into the lungs, through the walls of the chest, or through the diaphragm. The bones may also become carious in consequence of the pressure to which they are subject. When the matter points externally, fluctuation is perceived in the part, and the integument becomes tense during expiration. When an opening takes place into the lungs, a large quantity of matter of an offensive odour is discharged during a fit of coughing, and this is followed by great relief to the respiration. If the opening takes place externally, the discharge of matter is increased by strong expiration, as in coughing.

Physical Signs.—Enlargement of the diseased side, proportioned to the extent of the effusion; the ribs raised as in a deep inspiration; the intercostal spaces protruded, so as to be on a level with the ribs; sometimes perceptible fluctuation in the intercostal spaces: when the effusion is very considerable, universal dulness on percussion in all postures, with absence of respiratory murmur; when in less quantity, the dulness on percussion, and the respiratory and vocal sounds shift with the position of the body. In extreme cases, the heart is displaced so as to beat on the right side. Puerile respiration on the sound side, proportioned to the degree of compression on the lung of the diseased side. When the effusion is not very considerable, ægophony, generally most distinctly heard about the angle of the scapula.

Paracentesis Thoracis.—This operation must be performed with care and due precaution, and should not be delayed too long, as the structure of the lung will, in that case, become so condensed as not to admit of expansion during respiration. If the matter should point in any part of the chest, that part is to be preferred for the opening; but if not, the trocar should be introduced somewhere between the third and seventh ribs, and at the side where the intercostal spaces are widest. The grooved needle should be first introduced, and if there is evidence of fluid in the pleura, the trocar should be cautiously inserted, the skin having been previously drawn upwards, so that the external and internal opening may not correspond. The object is to avoid the introduction of air during the operation: to insure this more effectually, it has been recommended to introduce the trocar under

water. The matter must not be withdrawn all at once, but by repeated operations. Pressure by means of a bandage may be advantageously employed both during and after the operation. For more minute details, consult works on surgery.

The discharge of the effused fluid, whether brought about by internal remedies or by operation, cannot take place without more or less affecting the shape of the chest; for in by far the majority of cases, and in all cases where the effusion has been very considerable, the lung is either permanently condensed by the pressure, or bound down by firm adhesions. As the fluid, then, is absorbed, the walls of the chest must fall in, and this shrinking of the diseased side may be ascertained by measurement. The depression first shows itself in the upper part of the chest, but, as the absorption proceeds, extends to the whole of the affected side. The shoulder falls, and remains more fixed than that of the sound side, the ribs are closer together, the scapula approaches the spine and is more prominent, and the spine itself is often concave towards the same side; the contents of the abdomen, too, are pressed up into the affected side, whilst the lung of the sound side, expanding beyond its usual limits, displaces the mediastinum and the heart. These changes are accompanied by appropriate physical signs of condensed lung, namely, dulness on percussion, impaired respiratory murmur, bronchophony, and vocal fremitus. When the effusion is partial and confined by adhesions, the contraction will also be partial, and the physical signs more limited in their extent. Pleurisy may occur in young people, and lead to great deformity, without much impeding the function of respiration; but when it attacks the adult, it generally leaves behind it some dyspnœa, with a strong tendency to a recurrence of the disease.

PNEUMOTHORAX—AIR IN THE CHEST.

Air may find its way into the cavity of the pleura in two ways: 1. By an opening from the lungs, or through the walls of the chest. 2. By secretion. The first is the more common cause.

Symptoms.—These vary with the direction in which the opening takes place, and with the previous condition of the pleura. When, in consequence of a superficial ulceration of the lung an opening takes place into a previously healthy pleural sac, the entrance of air gives rise to dyspnœa, acute pain, dry cough, spasms of the intercostal muscles, a frequent, feeble, and sometimes irregular pulse. These symptoms, which take place more or less suddenly, according to the size of the opening, are soon followed by those of inflammation of the pleura. When inflammation already exists, the presence of air not only tends to increase it, but converts the otherwise inodorous pus into a highly-offensive discharge.

Physical Signs.—Unusually clear tympanitic sound on percussion,

with great indistinctness or total absence of respiratory murmur on the affected side, and *metallic tinkling*, or *amphoric resonance*. Increased distinctness of the respiratory murmur on the sound side. When there is liquid as well as air in the sac of the pleura, the physical signs are, dulness on percussion as high as the level of the fluid, that level shifting with change of posture; and metallic *ringing* heard after coughing, on *succussion*, and on sudden motion.

PROGNOSIS.—Generally unfavourable. In some instances, life is prolonged for many months.

TREATMENT.—This depends upon the stage of the disease, and the state of the patient. The sudden rupture of the lung is generally followed by symptoms of collapse and irritation, which may require stimulants and opium; when inflammatory symptoms come on, antiphlogistic measures must be prescribed, proportioned to the severity of the symptoms and the patient's strength. General blood-letting will rarely be admissible; we must, therefore, resort to local depletion by cupping or leeches, and counter-irritation. Tartar-emetic may be given in nauseating doses, and the bowels should be kept free by gentle aperients. When extreme dyspnœa is present, an opening must be made to give exit to the air, and this should be done at a part of the chest below the level of any liquid which it may contain. The operation may be repeated if necessary.

HYDROTHORAX—WATER IN THE CHEST.

This term is used to designate an effusion of *serum* into the sac of the pleura, empyema being employed to distinguish effusions approaching in consistence to the character of pus, and the result of pleuritis.

SYMPTOMS.—In most cases, the first symptom which shows itself is œdema of the lower eyelids, followed by swelling of the feet and ankles. This is soon followed by dyspnœa, increased upon exertion; and most considerable during the night, when the body is in the horizontal position. There is a distressing sense of weight and oppression at the chest; the countenance is pale; sometimes, however, it has the asthmatic purple tinge, and wears a peculiar and striking expression of anxiety; the urine is scanty; and there is great thirst. The pulse is irregular, often intermitting for two, sometimes for three strokes; there is palpitation of the heart, sometimes so great as to be both seen and heard, and cough, with expectoration generally tinged with blood. In describing his sensations, the patient frequently speaks of breathing through water. There is great difficulty in lying on the side opposite to the one affected; but when the disease exists in both cavities of the chest, the patient is incapable of lying down at all, and is obliged to be supported by pillows in an erect position. His sleep is disturbed by dreadful dreams of fire, of drowning, of falling down precipices, &c.; and frequently he awakes with a sense of suffocation,

suddenly starts from his bed, rushes to the open window for air, and is some time before he recovers his recollection. Anasarca of the upper extremities is a common concomitant, and the arm of the side in which the water is collected is generally cold and torpid, and often affected with numbness.

PHYSICAL SIGNS.—For these, see Empyema.

CAUSES.—Organic disease of the heart, extensive chronic disease of the lungs, causing a mechanical impediment to the circulation of the blood. The disease is probably never idiopathic.

PROGNOSIS.—Very unfavourable, as it indicates increasing severity of the organic disease which has given rise to it, and is in itself a formidable complication.

TREATMENT.—*Indications.* I. To reduce any existing inflammation. II. To promote the absorption of the effused fluid.

The first indication may be fulfilled by local depletion, by cupping or leeches, by counter-irritants, and by small doses of tartar-emetic. The second indication requires hydragogue cathartics, as the compound jalap powder, or elaterium; or diuretics, as digitalis, squills, acetate of potash, spiritus ætheris nitrici, infusum scopariæ, &c. The choice of these remedies must depend upon the patient's strength and state of health. If great debility is present, diuretics are preferable to drastic purgatives, and if the debility is extreme, the stimulant diuretics should be preferred. An operation is less likely to be attended with benefit in hydrothorax than in empyema, but it may be resorted to when the urgency of the symptoms requires it.

CHAPTER IV.

DISEASES OF THE PRIMÆ VIÆ, ORGANS OF DIGESTION, AND CHYLOPOIETIC VISCERA.

1. Diseases of the Mouth, Fauces, and Gullet.
2. Diseases of the Stomach.
3. Diseases of the Intestines.
4. Diseases of the Stomach and Intestines.
5. Diseases of the Liver, Pancreas, and Spleen.
6. Diseases of the Peritoneum.

DISEASES OF THE MOUTH, FAUCES, AND GULLET.

STOMATITIS	Inflammation of the Mouth.
GENGIVITIS	Inflammation of the Gums.
GLOSSITIS	Inflammation of the Tongue.
TONSILLITIS.	Inflammation of the Tonsils.
PAROTITIS	Inflammation of the Parotid Gland.
CYNANCHE THYROIDEA .	Bronchocele.

STOMATITIS—INFLAMMATION OF THE MOUTH.

SPECIES.—1. Stomatitis erythematosa; 2. Stomatitis membranosa; 3. Stomatitis folliculosa (aphthæ); 4. Stomatitis ulcerosa; 5. Stomatitis mercurialis; 6. Stomatitis gangrenosa.

1. ERYTHEMATOUS STOMATITIS.

SYMPTOMS.—The congested state of the lining membrane of the mouth in new-born infants disposes it to become the seat of erythema, characterised by redness and heat, and sometimes by dryness of the mouth and tongue. It often coexists with inflammation of the stomach and bowels, but is rarely accompanied by fever in very young infants, though this symptom is common to infants from the seventh to the ninth month. The inflammation may be confined to a part, or extend to the whole mouth, and even to the lips, which swell, excoriate, and sometimes become the seat of *herpes labialis*. The chronic form of the disease is often attended by profuse salivation.

TREATMENT.—Emollient applications to the mouth, and a milk diet; and if complicated with inflammation of the stomach and bowels (gastro-enteritis), the remedies applicable to that disease.

2. MEMBRANOUS STOMATITIS.

SPECIES.—1. Millet; 2. Diphtheria.

1. MILLET.

SYNONYM.—Muguet.

SYMPTOMS.—This disease is sometimes confounded with aphthæ. The false membrane presents itself in three forms:—1, as small white points spread over the tongue and inside of the mouth; 2, in larger or smaller patches; 3, as a false membrane covering the entire tongue and inside of the mouth. Sometimes the patches are tinged with bile, or with a sanguineous exhalation from the mucous membrane.

When the inflammation of the mouth subsides, the secretion is suspended, and the false membranes are detached, and disappear, leaving an inflamed surface beneath. If the inflammation continues, the white spots unite and form a large patch on the surface of the tongue, lips, or cheeks, or on the whole lining of the mouth. The inflammation may extend along the whole alimentary canal from the mouth to the anus, into the lungs, and along all the mucous surfaces.

When the disease is mild or partial, there is scarcely any constitutional disturbance; but, in the severe forms, and when the disease extends to the stomach and bowels, or along the mucous membrane of the air-passages, there is hot and dry skin, urgent thirst, frequent pulse, and other symptoms of fever. When the palate, tonsils, larynx, and trachea are affected, the voice is hoarse, and the cry dull.

CAUSES.—*Predisposing.* Early infancy; debility. *Exciting.*—The congregation of a great number of infants in the same place. Unsuitable food. The disease does not appear to be contagious, as MM. Baron and Billard have frequently observed healthy infants drinking from the same cup as the diseased, without contracting the disorder.

TREATMENT.—In simple and mild cases the mouth should be washed frequently with a piece of lint wetted with gum-water, or with a mucilaginous decoction containing a small quantity of the liq. sodæ chlorinatæ. In more severe cases, alum or sulphate of zinc, sweetened with syrup, may be substituted. The bowels must at the same time be regulated by mercurial purgatives. If the disease extend to the bowels, and diarrhœa is present, a strict regulation of the diet, according to the age of the patient, should be prescribed, and syrup of poppies, or small doses of pulv. cretæ C. c. opio.

2. DIPHTHERIA.

SYNONYMS.—Diphtherite. Angina membranacea.

SYMPTOMS.—This disease, which has recently (summer of 1858) been prevalent in England, consists of a deep-red inflammation of the mouth, tongue, throat, and fauces, attended by the formation of a dense false membrane adhering to the parts affected, the inflammation and effusion extending, as in the foregoing disease, to the mucous membrane of the intestinal canal, or of the air-passages. When it

extends into the air-tubes and lungs it is looked upon as a variety of croup. The constitutional symptoms are those of the typhoid stage of fever, the disease being characterised by great depression, and death taking place either from exhaustion or suffocation. The breath is in most cases extremely offensive.

ANATOMICAL CHARACTERS.—In a case reported by Dr. Laycock, the false membrane was found to contain the sporules and mycelium of the oidium albicans.

MORTALITY.—In some epidemics the disease has proved very fatal to life.

CAUSES.—*Predisposing.* The disease may occur at all ages, though most common in childhood. *Exciting.*—Contagion. Overcrowding, and defective drainage.

PROGNOSIS.—*Unfavourable* when the disease is extensive, and especially when it attacks the air-passages and lungs, and when it is attended from the first with great depression. *Favourable* in other cases.

TREATMENT.—*Indications.* 1. To support the strength. 2. To promote the destruction and removal of the false membranes.

1. This indication is fulfilled by nourishing diet and stimulants, as in the typhoid stage of continued fever. The tinctura ferri muriatis in full doses is strongly recommended by Dr. Heslop of Birmingham.

2. A saturated solution of biborate of soda, or of common salt; the dilute mineral acids of the P. L., or nitrate of silver in substance to be locally applied.

3. STOMATITIS FOLLICULOSA—APHTHÆ—THRUSH.

SPECIES.—1. Aphtha infantum; 2. Aphtha adultorum.

1. APHTHA INFANTUM.

SYMPTOMS.—An eruption on the tongue, lips, cheeks, gums, uvula, palate, and tonsils, of small white vesicles, single or confluent, which usually soften in the centre, and discharge a glutinous mucus forming a thick whitish crust, which adheres tenaciously for a time, but at length falls off, leaving a number of small ulcers. In some cases the lining membrane of the mouth and throat, and the surface of the tongue, become covered with patches of a loose ragged membrane, of a dull white, grayish, or reddish colour, and the disease may even extend to the œsophagus and stomach, and throughout the whole alimentary canal; in which case, mucus is evacuated in large quantities by vomiting and stool; or to the trachea and bronchi, when mucus is expelled by coughing. In these cases there is difficulty of mastification, deglutition, and respiration. Aphthæ often fall off in the space of ten or twelve hours, leaving the surface of the membrane between the ulcers of a bright-red colour. More generally they

remain for many days, and frequently a separation and reproduction take place several times before the termination of the disease.

In some cases there is scarcely any indisposition; but in others there is much feverishness and irritability, the mouth becomes hot and tender, and the infant experiences a disinclination to the breast, and is fretful whenever it is applied. Its appetite is bad, and its motions are offensive. The nipples of the nurse become painful, and sometimes excoriated or chapped, from the contact of the infant's mouth.

Aphthæ sometimes terminate in gangrene, when their edges assume a burnt, torn, and soft appearance, and they present a brown eschar, which, when detached, leaves an open granulating surface, of a bright-red colour. The surrounding parts become swollen, soft, and livid; saliva flows in large quantities from the mouth; the face is pale, and there is great prostration of the vital powers, with weak pulse and cold, pale skin. At length vomiting, diarrhœa, swelling of the abdomen, and sometimes hiccup, supervene, and usher in the fatal termination.

CAUSES.—*Predisposing.* The period of early infancy; the lymphatic temperament; debility. *Exciting.*—Impure air, improper food, disordered bowels, and the irritation of teething. Contagion?

TREATMENT. — *Indications.* I. To moderate or remove the inflammation, to produce a separation of the aphthæ, and to heal the superficial ulcers. II. To improve the general health.

I. The first indication will be accomplished by frequently washing the mouth with lint or soft sponge, firmly tied to a small piece of wood or whalebone, and dipped in warm water, milk and water, decoction of marsh mallows, linseed, or barley; or any other mild mucilaginous fluid; or by applying the vapour of such decoctions, or of warm water, to the interior of the mouth.

When the aphthæ are surrounded by highly-inflamed mucous membrane a leech may be applied to each cheek.

If after the inflammation is subdued, the aphthæ remain adherent, stimulant applications are required (one drachm of borax, one ounce of honey, and half-a-pint of water; or equal parts of honey of roses and barley-water, with a few drops of dilute sulphuric acid); or the ulcerated surface may be touched with a fragment of alum. We may also employ a dilute solution of chloride of lime or of soda, mixed with barley-water, and sweetened.

II. The bowels are to be opened with manna, magnesia, or castor-oil, and small doses of the hyd. c. cretâ. The diet must be appropriate to the age of the child, and the nursery must be properly ventilated. The warm bath may be used when the child is feverish and restless. Opiates, if administered, should be given with great caution and in small doses. In chronic cases, change of air is highly beneficial.

Gangrene consequent on aphthæ is extremely fatal, as it is accompanied by great prostration of strength. The local and general treatment must be that recommended in stomatitis gangrenosa.

2. APHTHA ADULTORUM.

The aphthæ of the adult rarely constitute an idiopathic disease. They are of most common occurrence in advanced stages of pulmonary consumption, and in diseases attended with slow and gradual exhaustion of the vital powers. The treatment required consists in the exhibition of alteratives, and strict attention to the state of the bowels, with gargles containing the mineral acids, alum, myrrh, or common salt. If these are ineffectual, nitrate of silver or sulphate of copper may be applied in substance.

4. STOMATITIS ULCEROSA—ULCEROUS INFLAMMATION OF THE MOUTH.

SYMPTOMS.—Inflammation of the gum and jaws, of one or both sides, accompanied by swelling, and followed by ulceration at the margin of the teeth; swelling and tension of the cheeks; salivation; fœtor of the breath; redness and heat of the face; injection of the conjunctiva; painful enlargement of the submaxillary glands. The local affection is accompanied by disturbance of the general health, fever, anorexia, and constipation. The ulcers are generally indolent, but occasionally spread till they lay bare the jaw.

CAUSES.—*Predisposing.* The period between the first and second dentitions; all causes of debility. *Exciting.*—Disorder of the stomach and bowels; cold.

PROGNOSIS.—*Favourable,* when the disease is idiopathic. *Unfavourable,* if it follow on fever or scarlatina, according to the severity of the primary disease.

TREATMENT.—I. Local. II. General.

I. The local treatment consists in the use of diluted acids, or of strong solutions of alum, zinc, or nitrate of silver. Tincture of myrrh may also be advantageously employed. In very severe cases, sulphate of copper or nitrate of silver in substance.

II. The constitutional treatment will consist in strict attention to the state of the bowels and the general health: a bland farinaceous diet should be prescribed, and pure air, with quinine or ammonia, if rendered necessary by existing debility. The best aperient will consist of equal proportions of the pulv. rhei, and hyd. c. cretâ, in doses proportioned to the age, followed by castor-oil.

5. STOMATITIS MERCURIALIS—MERCURIAL SALIVATION.

SYMPTOMS.—A disagreeable coppery taste in the mouth, looseness of the teeth, tenderness of the gums, a peculiar fœtor of the breath, and a constant profuse discharge of saliva, with flakes of false membrane; shooting pains in the face, stiffness of the jaw, and swelling of the parotid and submaxillary glands. The gums are first marked by a distinct red line, and then become generally red and swollen. The inflammation soon extends to the tongue, which is swollen, indented by

the teeth, and furred, and to the interior of the cheeks, and it sometimes proceeds to ulceration of the gums and cheeks, and in rare cases, to gangrene. These local symptoms are accompanied by some degree of fever and general irritation.

The duration of mercurial salivation, in slight cases, is two or three days; in severe cases, ten days or a fortnight, and if ulceration or gangrene ensue, still longer. Several weeks often elapse before the gums are restored to their healthy state.

DIAGNOSIS.—In most cases mercurial salivation is distinguished from spontaneous salivation, from the salivation of pregnancy, and from salivation produced by preparations of antimony, copper, arsenic, and gold, by digitalis, prussic acid, and iodide of potassium, and by several other substances, by the peculiar fœtor of the breath.

TREATMENT.—Gargles of alum, zinc, chloride of soda, chloride of lime, tannic acid, hydrochloric acid, acetate of lead, or brandy and water. In more severe cases, and when the gums are ulcerated, a strong solution of nitrate of silver (a drachm to an ounce and a half of distilled water), applied by means of a camel's-hair brush, or nitrate of silver, or sulphate of copper in substance. If much swelling of the glands is present, leeches to the jaws, followed by blisters behind the ears, and warm fomentations. If there is much irritation, opium may be given two or three times daily. Saline aperients and free ventilation complete the treatment.

6. STOMATITIS GANGRENOSA—GANGRENE OF THE MOUTH.

SYNONYMS.—Gangræna oris; cancer or cancrum oris; water canker; gangrenous erosion of the cheeks; charbon des joues; wasserkrebs; homa.

ANALOGOUS DISEASE.—Gangrene of the vulva.

DEFINITION.—Gangrene of the mouth from internal causes, generally attacking children.

SYMPTOMS.—The attention is often first called to a circumscribed, indolent, hard, shining swelling on one cheek (generally the left), without pain, heat, or redness. On examining the mucous membrane of the mouth, one or more ulcers, blisters, or white eschars, will be found on the internal surface of the cheek, lips, or gums. These gradually increase in size, and discharge a dirty sanious fluid, of a highly-offensive odour; the saliva is, at the same time, increased in quantity, and flows from the mouth mixed with membranous shreds. The swelling of the cheek increases till it involves the eyelids and lips. A dark livid spot now occupies the centre of the swelling, increases in size, softens, and sloughs. Gangrene having set in, makes rapid progress both within the mouth and on the surface, and at length involves *the whole of the* cheek, lips, and gums, and in extreme cases the *nostrils, eyelids, neck,* and pharynx; the teeth fall out, and the bones of

either or of both jaws, and even the cheek and frontal bones, are ultimately attacked. The constitutional symptoms by no means keep pace with the severity of the local affection. In the majority of cases there is no fever, no loss of appetite, and little impairment of strength. The little patient will often continue to run about and play, to sit up, and to amuse himself, till within a short period of his death, the faculties of the mind remaining altogether intact. More rarely the local symptoms are accompanied by fever. Still less frequently the child becomes delirious. Death is ushered in by symptoms of collapse. In cases of recovery, the favourable change is indicated by reaction.

TERMINATIONS.—1. In *recovery*. 2. In partial recovery followed by relapse. 3. In *death* by exhaustion; by starvation from inability to swallow; by hæmorrhage from the separation of sloughs; by the progress of the disease upon which it has supervened; or by complication with hepatisation of the lungs.

COMPLICATIONS.—Pneumonia (58 cases in 63); pleurisy; enteritis; gangrene of the lungs, pharynx, œsophagus, and stomach; gangrene of the extremities, and of the vulva; scrofulous affections.

CAUSES.—*Predisposing*. *Age* from a year and a-half to twelve years; usual limits three to eight years; most common period, the third and fourth years; in rare cases, as early as fifteen months, one year, three months, or even a few days; also very rarely as late as from fifteen to thirty years; in one instance seventy-two years. The *female sex* (about two females to one male). Improper or insufficient nourishment; the impure air of crowded foundling hospitals and hospitals for children; the damp and filthy habitations of the poor; low, damp situations, as marshes and the borders of rivers; rainy seasons; the spring and autumn; all the causes of debility and cachexia. *Exciting*.—Continued, remittent, and intermittent fevers; the febrile exanthemata; in order of frequency as follows—Measles; small-pox; scarlatina; prolonged gastric irritation; intestinal worms; whooping-cough; pneumonia; congenital syphilis; mercurial preparations in excess, or in children peculiarly susceptible of their action. Contagion.

DIAGNOSIS.—From *gangrenous aphthæ*, by these being confined to the secreting follicles of the mucous membrane, by their number, small size, and slow course, and the absence of swelling of the integuments. From *malignant pustule*, by the absence of the febrile symptoms which precede that affection, which is simply a gangrenous affection of the skin unaccompanied by any disease of the mucous membrane. From *anthrax*, by the absence of acute pain and inflammatory symptoms, by the extensive and rapid destruction of parts, and by the coincidence of disease in the mucous membrane. Anthrax is very rare on the cheek. From most cases of scurvy, by this disease being confined to the gums. From *hospital gangrene*, by the acute pain and severe constitutional disturbance attending that disease. From the several forms of *stomatitis*, by the combination of the affection of the mucous membrane with

the gangrene of the integuments. From the effects of *mercury*, by the history of the case; by the swelling of the gums, the abundant flow of saliva, the peculiar odour of the breath, the swelling of the tongue, the numerous superficial ulcerations, the shreds of false membrane, and the falling out of the teeth occurring in severe cases of mercurial salivation. The diagnosis is very difficult when either affection is of some standing, and the previous history obscure.

PROGNOSIS.—Most unfavourable. Mortality about 75 per cent. In some epidemics every case has proved fatal. An early age, previous great exhaustion, and treatment postponed till the gangrene has fairly set in, are among the unfavourable circumstances.

TREATMENT.—I. Local. II. General.

The *local* treatment consists in the employment of stimulating applications. Previous to the appearance of the livid spot, stimulating embrocations, such as the linamentum camphoræ compositum, or the linamentum ammoniæ, to the cheek. Should gangrene have set in, strong acetic, muriatic, nitric, or sulphuric acid, or the actual cautery, the part having been previously incised. In the intervals chloride of soda or chloride of lime in powder sprinkled on the incision. Similar applications must be made to the mucous membrane. Before gangrene has set in, it may be sufficient to apply chloride of soda or of lime mixed with water to the consistence of a stiff paste, or the muriatic or pyroligneous acid, or lunar caustic. When the parts have become gangrenous, the stronger acids, or the actual cautery, must be substituted. When the eschar has separated, the chloride of soda or the chloride of lime, or the weaker acids, may be resumed.

The *general* or *constitutional* treatment will depend, in some degree, on the previous history of the case, as well as on the actual condition of the patient. Pure air, scrupulous cleanliness, and nourishing diet, are obviously indicated in all cases. Beef-tea thickened with arrow-root, arrow-root made with milk, calf's-foot jelly, and wine by itself, or diluted with water, or added to nourishing articles of food, should be freely and frequently administered. Quinine in the diluted acids, or in wine, and carbonate of ammonia, in doses proportioned to the age of the child, are the best medicines.

The state of the bowels must be carefully attended to. If constipation is present, the compound rhubarb or compound jalap powder, followed by castor-oil or saline aperients, must be given, as often as the state of the bowels require it. Diarrhœa must be met by the chalk and opium powder, or other suitable remedies adapted to that disorder, especially injections of starch and opium; pneumonia, if present, by opium, with full doses of liquor ammoniæ acetatis.

REMEDIES.—*Local.* A blister to the cheek. Quinine, camphor, and charcoal in powder. An ointment composed of storax and vegetable charcoal, each one ounce; camphor, myrrh in powder, of each a drachm; oil of turpentine, as much as may be necessary to make an ointment (Richter). Phosphoric acid; creasote; arsenical prepara-

tions; acid nitrate of mercury; chloride of antimony; chloride of zinc; leeches. *General.* — Phosphoric acid; lemon-juice; musk; charcoal and camphor; chlorate of potash in scruple doses.

GENGIVITIS—INFLAMMATION OF THE GUMS—PAINFUL DENTITION.

Dentition or teething in infants in perfect health is unproductive of pain or disease. In general, however, infants suffer more or less severely during dentition, from irritation in the stomach and bowels, often followed by diseases of the head and chest.

SYMPTOMS.—Dentition is generally accompanied by an increased flow of saliva, and the gum is red, hot, painful, and swollen. The infant puts its fingers, or whatever it can grasp, into the mouth, and presses its gums upon it. Pressure, however, is not borne when true inflammation is present, in which case there is even reluctance to take the nipple. In other cases there is intense inflammation of the gum, extending to the lining membrane of the mouth, and ulceration, followed by aphthæ, or gangrene.

The general symptoms are feverishness, fretfulness, disturbed sleep, determination of blood to the head, often accompanied by diarrhœa and griping pains in the belly; and inflammation of the brain or its coverings. In extreme cases, water in the head, with convulsions, inflammation of the lungs, or laryngismus stridulus. Skin diseases are also of frequent occurrence, of which the most common are strophulus and lichen.

TREATMENT.—In mild cases, gentle friction of the gums; in more severe cases, scarification. The use of the warm bath, the proper regulation of the diet, and a strict attention to the state of the bowels, complete the treatment. The diseases which supervene on teething must be treated on the same principles as the idiopathic affections.

Incision of the gums ought not to be practised unless they are swollen, hot, and painful, in consequence of the pressure of the teeth. When the incision is made prematurely, the appearance of the tooth, so far from being accelerated, is retarded. The incisions should be deep and free. One incision should be made parallel to the alveolar margin; and a second incision transverse to the first.

The gums are subject to swelling, ulceration, and gangrene, both in the infant and in the adult. When these affections occur in the adult, they are generally parts of other more general diseases of the system, such as scurvy, or mercurial salivation; in young children, they are more commonly idiopathic.

GLOSSITIS—INFLAMMATION OF THE TONGUE.

SYMPTOMS.—Inflammation of the whole tongue is a rare disease, except as the consequence of profuse salivation, or the application of strong irritants. More commonly it is of limited extent, appearing at first as a hard tumour on the upper surface. This tumour suppurates slowly, and leaves a deep ulcer, which sometimes penetrates the tongue. It owes its origin, in most instances, to derangement of the stomach and bowels, and is cured by purgatives with the local application of nitrate of silver.

Inflammation of the whole tongue is often a severe and dangerous disease, characterised by heat, swelling, and pain, difficult speech and deglutition, dyspnœa, salivation, swelling of the veins of the neck, and determination of blood to the head, with the familiar symptoms of inflammatory fever.

TERMINATIONS.—In resolution, suppuration, or gangrene. In extreme cases it threatens suffocation or apoplexy.

CAUSES.—Mechanical injuries; strong irritants; the sting of insects; salivation; extension of diseases affecting the tonsils, gums, and cheeks.

TREATMENT.—In the early stage, general and local depletion, according to the severity of the symptoms, with brisk purgatives and other antiphlogistic remedies, and ice to the surface of the tongue. In a more advanced stage, free incisions. When these remedies fail, and suffocation is threatened, tracheotomy must be performed.

Ulceration sometimes takes place on the side of the tongue, from the irritation of a decayed tooth. In this case, the cause of irritation must be removed by filing or removing the tooth.

Scirrhus of the tongue is known by the peculiar hardness of the tumour, the irregular ulceration, the acute lancinating pain, and the cachectic state of the constitution.

Syphilitic ulcerations of the tongue, with foul surface, and irregular hard margins, occupying chiefly its edges, require a course of mercury or iodide of potassium, with the local application of sulphate of copper, or nitrate of silver, in substance.

TONSILLITIS—INFLAMMATION OF THE TONSILS.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE TONSILLITIS.

SYNONYMS.—Cynanche tonsillaris. Angina tonsillaris. Amygdalitis. Quinsy. Inflammatory sore throat.

SYMPTOMS.—*After* rigors, followed by flushes of heat, and pains in

the back and limbs, and a full, frequent, and compressible pulse, a sense of fulness, heat, and dryness in the throat, pain and difficulty in swallowing, and hoarseness of the voice. The throat itself presents a diffused redness, of a deeper colour over the tonsils, which are swollen, and covered with a viscid mucus; and the tongue is coated with a white creamy fur. As the disease advances, the swelling of the tonsils increases; the act of swallowing becomes more difficult and painful; liquids return through the nostrils, and there is a constant discharge of viscid saliva; the hoarseness of the voice and the impediment of the speech increase, the respiration is affected, and there is a painful sense of tension, with acute darting pains in the ears. The febrile symptoms increase in severity with the enlargement of the tonsils, and the pain in the back and limbs becomes more acute; but in a more advanced stage of the disease, the fever often subsides, or changes its character from that of inflammatory fever during the first stage, to that of mild hectic during the stage of suppuration.

DURATION.—From five to seven days.

TERMINATIONS.—By resolution, suppuration, ulceration, or gangrene; or in chronic enlargement.

PROGNOSIS.—The disease may be expected to terminate by resolution when the respiration is not much impeded, when the act of swallowing is neither very difficult nor very painful, and when, on examination, the tonsils are not found highly inflamed or much enlarged. Suppuration is to be feared when the disease is prolonged, and does not yield to remedies, when the local pain is acute and throbbing, or when there are rigors or cold shiverings without any evident cause. An abscess is indicated when there is much swelling, a sense of fluctuation on pressure made with the finger, a whiteness of some part of the tumour, and, finally, purulent expectoration. Gangrene is to be dreaded, if the fever is intense, and the pain extremely violent, without any sign of resolution or suppuration. A pinched and sunken countenance, the extremities cold and covered with a clammy perspiration, a small, frequent, weak, and intermittent pulse, and a very fœtid odour issuing from the mouth, are signs of its existence.

CAUSES.—*Predisposing.* Childhood, youth, and middle age (it rarely occurs after forty years of age); previous attacks. *Exciting.*—Cold; cold drinks while the body is heated; the deglutition of acrid or stimulating substances; long and loud crying, or singing.

TREATMENT.—When the disease is slight, the treatment proper to catarrh (see Catarrh). When the disease is more severe, it may be necessary at the onset to apply leeches to the throat, to administer brisk aperients, to give nauseating doses of tartar-emetic, and to allow the patient to drink freely of iced-water, or to swallow rough ice. When, however, the disease has made some progress, and suppuration has commenced, the cold water or ice should be omitted; warm poultices should be applied externally, the patient should be directed to inhale the steam of hot water, and to use emollient gargles, and the

abscess should be allowed to discharge itself. If the respiration is much impeded, from the great enlargement of the tonsils, emetics will sometimes cause the abscess to burst. If suffocation is imminent, the abscesses must be opened by a lancet or bistoury. In the majority of cases the tumours subside of themselves, or the abscess discharges itself without requiring any interference.

REMEDIES.—Pulvis guaiaci, in doses of ʒss. every six hours, at the onset of the attack. Stimulant applications to the throat. At the outset of the attack, before the tonsils have become greatly swollen, or before suppuration has commenced, great benefit may be derived from the repeated application of nitrate of silver, either in substance, or in strong solution, by means of the camel's-hair brush.

2. CHRONIC TONSILLITIS.

Chronic enlargement and induration of the tonsils often follows an acute attack of tonsillitis. It is also of frequent occurrence in cachectic constitutions, and in the chronic forms of dyspepsia. Sometimes, also, it is prevalent during epidemics of scarlatina.

SYMPTOMS.—Some difficulty in swallowing, hoarse voice, impeded respiration, and deafness commonly attend this enlargement of the tonsils; with a liability to attacks of more acute inflammation.

CAUSES.—*Predisposing.* Cachexia, scrofula, and chronic dyspepsia. *Exciting.*—Straining of the throat in unskilful use of the voice.

TREATMENT.—The disease is sometimes removed by improving the general health. When, however, it does not yield to constitutional remedies, and the tonsils are of such a size as to impede deglutition or respiration, or to affect the voice, excision may be practised with advantage. The same remedy is recommended in chronic relaxation of the uvula. The ointment or tincture of iodine may be applied externally with benefit. The best internal applications consist of strong solutions of nitrate of silver, or sulphate of copper, or the tincture of iodine, applied by a camel's-hair pencil, two or three times a-day.

Ulceration of the tonsils may likewise occur in disordered states of health, but it is more commonly one of the secondary effects of syphilis. The disease is generally slow in its progress; but, if not speedily removed, attacks the surrounding textures, extending into the nostrils and fauces, and ultimately attacking the larynx itself. *Syphilitic ulceration of the tonsils* may be treated by five-grain doses of Plummer's pill given three or four times a-day, till the gums are slightly affected, or, if the patient has been already salivated, by the iodine of potassium in five-grain doses three or four times a-day. Either remedy may be given with the decoction of sarsaparilla. A gargle of the chloride of soda may, at the same time, be used with much advantage, and the ulcers may be frequently touched with nitrate of silver. The general health *must be* carefully attended to, and the strength must be supported by a nourishing and generous diet.

If the ulcers should continue to spread under the use of the iodide of potassium, a course of mercury must be substituted.

The disease known as '*Clergyman's sore-throat*,' or '*dysphonia clericorum*,' consists at first in a chronic enlargement of the tonsils and lengthening of the uvula, with a relaxed and congested condition of the mucous membrane of the fauces, which gradually extends to the pharynx and upper part of the larynx. In the most severe cases of the disease, there is also ulceration of the mucous follicles of the parts affected, and the mucous membrane, especially about the pillars of the fauces, is coated with a tenacious secretion. The *symptoms* are dryness and tickling of the throat, constant hawking and spitting, and hoarseness of the voice. After reading or speaking the hoarseness increases, and is sometimes attended with pain in the upper part of the windpipe. Occasionally the patient loses his voice altogether. The general health is, at the same time, impaired, the patient being in a cachectic state; or the disease may coexist with, or follow upon other diseases of the air-passages and lungs. The disease is generally traceable to a bad habit of reading and speaking in persons of a relaxed habit of body. The treatment will consist in the exhibition of alteratives and tonics to improve the general health, the particular remedies employed being determined by the existing state of the system; and in local measures calculated to remove the relaxed and congested state of the mucous membrane. The best local application is a strong solution of nitrate of silver (ʒi. to ℥i. of water). This should be applied, by means of a camel's-hair brush or a piece of sponge, to the whole of the inflamed surface. If this mode of application should prove insufficient, the solution of nitrate of silver will have to be applied to the upper part of the larynx by means of a whalebone probang tipped with sponge. When there is great enlargement of the tonsils of long standing, excision may become necessary, as in simple chronic tonsillitis. Clergymen suffering in this way should be directed to take a full breath very frequently while reading or preaching, so as to speak from the lungs and not from the throat; and to take lessons in elocution.

CYNANCHE PAROTIDEA—THE MUMPS.

SYNONYM.—Parotitis.

SYMPTOMS.—After slight febrile symptoms, fulness and soreness at the angle of the jaw, with pain on moving the part. The swelling extends by degrees upwards to the space between the cheek and ear, and downwards to the submaxillary gland, occasioning great deformity. On the fourth day it begins to subside. It generally appears at first on one side, sometimes it attacks the other afterwards; less frequently it attacks both sides at once. The disease is sometimes accompanied towards its decline, or it is followed, by painful swelling of the breasts or testicles. It generally terminates in resolution.

CAUSES.—*Predisposing.* The period of childhood. *Exciting.*—Contagion; exposure to cold; scarlatina, and other febrile diseases.

TREATMENT.—Warm fomentations, with the application of flannel in the intervals; gentle aperients and farinaceous diet. If much inflammation is present, leeches may be applied. The secondary affection of the breasts or testicles must be treated in the same way. Should any swelling remain after the inflammation has passed away, friction with stimulating liniments may be prescribed.

Sometimes a metastasis of the inflammation takes place to the brain. In this case, the treatment will be that of idiopathic affections of the brain.

CYNANCHE THYROIDEA—BRONCHOCELE—GOITRE.

SYMPTOMS.—A swelling affecting the entire thyroid gland, or a single lobe of it; at first firm and elastic, but after a time soft, flabby, and containing small portions of a denser consistence. It grows slowly at first, but after a time increases rapidly, extending in all directions, upwards towards the jaw, laterally beyond the limits of the neck, and frequently hanging over the chest. It sometimes attains an enormous size, in which case it may cause serious inconvenience by its pressure on surrounding parts, on the trachea, and on the vessels of the neck.

ANATOMICAL CHARACTERS.—The gland is found surrounded with a large quantity of condensed cellular membrane; the gland itself is hypertrophied either partially or through its whole extent, and presents, when cut into, a congeries of cells, varying in size from that of a pea to considerable cavities, and containing fluids of various character and consistence.

CAUSES.—*Predisposing.* Female sex; the age of puberty; hereditary tendency. *Exciting.*—Unknown. The disease is endemic in localities differing widely from each other in all respects. But the most common characteristic of the spots in which it prevails is want of due movement of the air. It is very common in deep valleys shut in by mountains. Combined with idiotcy or imbecility, it is the *Cretinism* of the Vallais.

TREATMENT.—Iodine in the form of ointment, tincture, or paint, externally. The iodide of potassium internally, in doses of one or two grains three times a-day. In plethoric subjects, or where there is local inflammation, the previous use of depletion, general or local. Benefit is often derived from the application of leeches. Removal from the district in which the disease originated.

When other means fail, and the tumour, by its pressure, causes great inconvenience, surgical aid may be necessary. Setons have been used with advantage; and the thyroid arteries have been tied with *temporary benefit*. The tumour has also been extracted; but the

operation is attended with alarming hæmorrhage, and has been followed by fatal consequences.

REMEDIES.—The burnt sponge, which contains minute quantities of iodine, was formerly in great repute for the cure of this malady.

DISEASES OF THE ŒSOPHAGUS.

ŒSOPHAGITIS—INFLAMMATION OF THE ŒSOPHAGUS.

SYMPTOMS.—Pain, or a sensation of burning, in the act of swallowing, either in a part of the œsophagus, or through its whole extent. This pain is sometimes increased on pressing the larynx firmly towards the spine. When the inflammation extends to the mucous membrane of the stomach, there is pain in the epigastrium, with vomiting, leading, in some instances, to the expulsion of tenacious casts of the tube. In cases of œsophagitis, produced by swallowing hot water or corrosive poisons, large flakes of epithelium are often discharged.

CAUSES.—Stimulant and corrosive applications to the tube itself, such as hot water, and the several corrosive poisons. The extension of inflammation from the mouth, fauces, or tonsils; wounds; and mechanical injury from the frequent or unskilful use of the probang.

TREATMENT.—The appropriate treatment consists in the frequent use of ice or iced water, and a farinaceous liquid diet. So long as the difficulty of swallowing remains very great, the patient must be supported by nutritious injections.

OTHER DISEASES OF THE ŒSOPHAGUS.

The gullet is subject to other functional and structural diseases, among the former of which may be mentioned rheumatism and spasmodic stricture; among the latter, hypertrophy of the submucous tissue, and various malignant degenerations, such as scirrhus and medullary sarcoma. It may also become subject to pressure from aneurism of the aorta or carotid artery, from enlargement of the cervical glands, and from diseases of the spinal column.

Rheumatism of the gullet is a rare disease, characterised by painful deglutition distinctly referred to some part of its course, accompanied by rheumatism of other muscles, and yielding to the treatment proper to muscular rheumatism.

Spasmodic stricture of the gullet is characterised by difficulty of swallowing, accompanied by a sense of choking in the throat, the food either passing into the stomach after many efforts to swallow, or being rejected. It is generally associated with other symptoms of

hysteria, and is amenable to the treatment proper to that disease. It is distinguished from organic stricture by the circumstance of its not being constant, but subject to intermissions; by the result of an examination with a bougie; by the history of the case; and the presence of other hysterical symptoms. It requires no local treatment; but in obstinate cases, the daily introduction of a bougie may be attended with benefit.

DISEASES OF THE STOMACH.

GASTRITIS	Inflammation of the Stomach.
DYSPEPSIA	Indigestion.
GASTRALGIA . . .	Pain in the Stomach.
PYROSIS	Water-brash.
HÆMATEMESIS . . .	Vomiting of Blood.
ULCER OF THE STOMACH.	
PERFORATION OF THE STOMACH.	
CARCINOMA OF THE STOMACH.	

GASTRITIS—INFLAMMATION OF THE STOMACH.

SPECIES.—1. Acute; 2. Subacute.

1. ACUTE GASTRITIS.

SYMPTOMS.—An acute fixed pain and sense of burning heat in the pit of the stomach, increased by pressure, deglutition, and the movements of respiration; frequent vomiting, attended with increase of pain; intense thirst; great restlessness, and extreme anxiety; the tongue red at its point and margins, or over its entire surface; the pulse quick, small, and hard; the bowels confined.

The disease is rarely limited to the stomach, but extends to the gullet and intestines, being accompanied by pain and difficulty in swallowing, diarrhœa, and extreme tenderness of the abdomen.

TERMINATIONS.—*In resolution*, when the pulse becomes more soft and full, and the other symptoms gradually disappear. *In chronic gastritis:*—*In gangrene*, marked by a violent exacerbation of the symptoms, followed by a sudden cessation of pain, a rapid and intermitting pulse, the utmost prostration of strength, cold extremities, delirium, hiccup, and death. *In ulceration followed by perforation*, characterised by sudden and acute pain, with extreme prostration, followed by the symptoms of peritonitis.

CAUSES.—Drinking cold fluids while the body is heated; drinking hot water; acrid or poisonous substances taken into the stomach. Acute gastritis is, in most cases, the effect of irritant poisons. Idiopathic inflammation almost always assumes the form of subacute *gastritis.*

DIAGNOSIS.—From *enteritis*, by the seat of the pain, as ascertained by pressure; by the peculiar sense of burning heat in the epigastric region; by the more severe vomiting.

PROGNOSIS.—*Favourable.* The pulse becoming softer, fuller, and less frequent; and the pain and tenderness gradually ceasing. *Unfavourable.*—The continuance of the disease without any marked alleviation of symptoms. Extreme and general tenderness of the abdomen. Symptoms marking the accession of gangrene, or the occurrence of perforation.

ANATOMICAL CHARACTERS.—The mucous membrane of the stomach universally red, or covered with patches of inflammation, especially around the cardia and pylorus; deep redness of the rugæ; abrasion, ulceration, or softening of the membrane; gangrene; also dark patches resembling gangrene, but arising from the effusion of blood into the submucous cellular tissue; the blood-vessels full of dark blood. Gangrene and ulceration are rare, but softening is common.

TREATMENT.—*Indication.*—I. To reduce the inflammatory action. II. To diminish the irritability of the stomach.

I. The first indication is fulfilled,—

a. By bleeding from the arm, or by the free application of leeches to the pit of the stomach.

b. By iced-water or ice, externally and internally.

c. By keeping the bowels open, in the absence of diarrhœa, with emollient clysters.

d. By the free and frequent use of mucilaginous diluents, such as gruel, linseed-tea, or barley-water.

II. The sickness, restlessness, and pain are best relieved by small doses of dilute hydrocyanic acid (♏iii. to ♏v.).

2. SUBACUTE GASTRITIS.

SYMPTOMS.—Pain in the epigastrium increased by pressure, and *immediately* on taking food, with constant nausea or sickness, the stomach rejecting food *as soon as* it is swallowed, or after a short interval. The tongue is sometimes red at the tip and edges, and furred in the centre; at others, morbidly red over the entire surface; but in many cases perfectly clean. The bowels are generally costive. A dry cough is a common complication.

CAUSES.—Constipation; unwholesome diet; an occasional increase of dyspepsia.

TREATMENT.—In the more severe cases, a few leeches to the epigastrium, followed by a blister or mustard poultice. In less severe cases, the counter-irritant alone. The diet to consist of gruel, arrow-root, or sago, made with water or milk, to the entire exclusion of solid food, till the sickness and tenderness on pressure disappear; when the patient should be allowed gradually to resume his usual diet. A

mucilaginous mixture with a few drops of tincture of hyoscyamus may be given three times a-day; and the bowels must be kept open by the compound rhubarb or aloetic pill, or by castor-oil.

DYSPEPSIA—INDIGESTION.

SYMPTOMS.—Want of appetite; nausea; flatulence; heartburn; occasional pain in the epigastrium; a sense of fulness and oppression after eating, or a feeling of languor and depression relieved by taking food. These symptoms, variously combined, and generally accompanied by some disorder in the functions of the bowels, in the form of constipation, diarrhœa, or the two conditions alternately, and with more or less derangement in the functions of the liver, constitute the most common form of dyspepsia. Cold extremities; headache; vertigo; a foul tongue; a bitter taste in the mouth; dimness of vision, imperfect or double vision, bright spots before the eyes, or muscæ volitantes; singing in the ears; palpitation; irregular or intermittent pulse; shooting or fixed pains in the region of the heart, and under the scapulæ, varying with the degree of flatulence, are occasional symptoms of dyspepsia; to which may be added, gastralgia and pyrosis. (See those diseases.)

CAUSES.—Debility; want of exercise; want of cleanliness; depressing passions; food difficult of digestion; overloading the stomach with food; imperfect mastication; liquids in excess, especially hot tea and coffee; too short or too long intervals between meals; the abuse of spirituous liquors, opium, and tobacco; the frequent use of drastic purgatives; exercise immediately after taking food; diseases of the liver, pancreas, or spleen; the gouty diathesis. Dyspepsia is a frequent precursor of pulmonary consumption, and a common accompaniment of the several forms of asthma.

DIAGNOSIS.—From *subacute gastritis*, by the pain, if any, not following immediately upon a meal; and by the absence of pain on pressure over the pit of the stomach.

PROGNOSIS.—*Favourable*, in recent cases; *unfavourable*, in proportion to the time that it has lasted. It is not in itself a fatal disease.

TREATMENT.—*Indications.* I. To correct any bad habits into which the patient may have fallen, and to regulate the diet. II. To restore the tone of the stomach. III. To palliate urgent symptoms.

I. The most important step to be taken in the cure of dyspepsia is to point out to the patient the necessity of changing such habits and pursuits as may have tended to give rise to the disease, and continue to aggravate it.

The habits which are most likely to require correction are the following:—*Eating* too much at one time; eating too often or too *seldom*; *taking* too great a variety of food at the same meal; drinking

too much liquid before or with the meals; imperfect mastication of food; resuming bodily or mental occupation directly after eating; indolent and sedentary habits; the neglect of personal cleanliness (daily ablution of the body with cold water or the shower-bath, followed by friction with a rough towel, or the flesh-brush, or hair-gloves, should be particularly insisted on); taking purgatives, not because the bowels require them, but because the patient feels uneasy; drinking, smoking, chewing tobacco, opium-eating, and drinking tea and coffee in excess. If any particular article of food seem to disagree, it should be carefully avoided. Where there is much flatulence, vegetables and fruit in excess will often be found to increase the disorder. Wine will sometimes require to be exchanged for weak brandy and water, or for brandy with soda-water, or Seltzer water; and common beer for the bitter beer or ale.

II. The second indication is fulfilled by remedies belonging chiefly to the class of tonics; by the bitter infusions, such as the infusions of quassia and gentian, with the aromatic waters; by the mineral waters of Buxton or Selters; by quinine; by the mineral tonics, bismuth, steel, zinc, and nitrate of silver; and by the mineral acids. These remedies, if not incompatible with each other, may be given in combination, or they may be combined with aperients. In mild cases of dyspepsia, a dinner-pill consisting of rhubarb, ginger, and capsicum may be given about an hour before dinner with great advantage. (℞. Pulv. rhei, Pulv. zingib., Pulv. capsici āā ℈ i. Ol. menthæ pip. q. s. Ut fiant pil. xii.) The compound rhubarb pill of the Pharmacopœia may be given as a dinner-pill in mild cases of dyspepsia.

III. If there is great acidity, alkalies and alkaline earths are indicated, as the liquor potassæ, or the carbonate of soda or magnesia; if constipation, aperient medicines regularly administered, so as to relieve the bowels without inducing hypercatharsis; if there is yellowness of the skin, or conjunctiva, or the evacuations are clay-coloured, or there is hæmorrhage from the stomach or bowels, small doses of mercurial preparations, or of the nitro-muriatic acid; if diarrhœa, a strict regulation of the diet, and the remedies mentioned under that head; if constant sickness, hydrocyanic acid given at short intervals, in doses of three drops of the dilute acid cautiously increased. If the symptoms of subacute gastritis should supervene, the treatment proper to that disease. If gastralgia or pyrosis exist, the remedies recommended under those heads.

GASTRALGIA—PAIN IN THE STOMACH.

SYNONYMS.—Gastrodynia; cardialgia; neuralgia of the stomach.

SYMPTOMS.—Acute pain in the epigastrium, occurring at a variable interval of from half-an-hour to three hours after a meal, generally relieved by pressure and by food. It is associated with other symptoms of dyspepsia, and is often terminated by pyrosis.

DIAGNOSIS.—From *subacute gastritis*, by the pain in gastralgia coming on at a considerable interval after taking food. By the pain being relieved, or not increased, by pressure. By the vomiting, if present, also coming on after an interval, and consisting of clear fluid.

CAUSES.—Those of dyspepsia; strong and sudden mental emotions; flatulence; the abuse of tea, coffee, and warm liquids.

TREATMENT.—*Indications.* I. To subdue the irritability of the stomach. II. To avoid the occasional causes. III. To improve the general health.

I. The remedies which best answer the first indication are the salts of the less active minerals, such as the nitrate of bismuth, or the sulphate of zinc. Hydrocyanic acid, morphia, and henbane may also be given with advantage, either alone or in combination. The nitrate of bismuth, ten grains three times a-day, suspended in any mucilaginous mixture, is the best remedy in mild cases; the stronger sedatives, of which hydrocyanic acid is the best, may be required in the more severe forms of the disease. A combination of nitrate of bismuth and hydrocyanic acid (ten grains of the salt of bismuth with three, four, or five drops of the dilute acid) is sometimes extremely beneficial. The tonic infusions may also be prescribed with advantage. When there is much flatulence, alum, in combination with ginger (five or ten grains of each), may be administered three times a-day. Smoking tobacco or stramonium is often attended with benefit. Creasote and nitrate of silver have been recommended in dyspepsia; but the latter remedy is one which should not be resorted to till other metallic irritants have failed.

In one case, in which there was some tenderness in the upper part of the spine, the tartar-emetic ointment rubbed into the seat of pain cured severe gastralgia, attended with distressing vomiting, after the nitrate of bismuth and hydrocyanic acid had failed. (G.)

II. The second indication can only be fulfilled by attending to the patient's history of the effect of different kinds of food and drink upon his symptoms. These effects vary in every case. In one patient, the disease will disappear on leaving off the use of tea, another will derive the same benefit from abstaining from potatoes.

III. The improvement of the general health may be effected by regular living, early rising, cold sponging followed by friction, or the cold bath, by change of air, and by careful attention to the state of the bowels.

PYROSIS—WATER-BRASH.

SYMPTOMS.—In the morning or forenoon, when the stomach is empty, or some hours after a meal; and after suffering from gastralgia, vomiting of a thin watery fluid, in considerable quantity, sometimes of an acid taste, but often quite insipid. The free discharge of the fluid generally gives relief to the pain, and puts an end to the fit.

CAUSES.—*Predisposing.* Middle age. *Exciting.*—The common causes of dyspepsia.

TREATMENT.—That of gastralgia. If the liquor ejected from the stomach be highly acid, the liquor potassæ or the carbonate of soda or magnesia, may be combined with the other remedies. (℞. Bismuthi nitratis gr. x. Acidi Hydrocyanici dil. ♏iii. Liq. Potassæ ♏xx. Mucil. acaciæ, Syrupi Tolut. āā ʒii. Aquæ ℥ss.) The dose of the acid to be cautiously increased, if necessary.

HÆMATEMESIS—VOMITING OF BLOOD.

SYMPTOMS.—Vomiting of dark-coloured grumous blood in greater or less quantity, often mixed with food, and preceded by a sense of weight and obtuse pain in the region of the stomach. The countenance is sallow, and the conjunctiva of the eyes tinged with bile.

CAUSES.—*Predisposing.* The female sex; middle age; intemperance; peculiarity of constitution. *Exciting.* — Suppression of habitual evacuations, especially of the menstrual discharge (vicarious hæmatemesis); tumours compressing the liver or spleen; external violence; obstructions in neighbouring viscera.

ANATOMICAL CHARACTERS.—Congestion of the mucous membrane of the stomach, general or partial; congestion or chronic disease of the liver; ulcers in the stomach; malignant disease.

DIAGNOSIS.—From *hæmoptysis*, by the blood being vomited, not coughed; by being mixed with food, and not with sputa; and by being of a dark colour instead of a bright red. In certain rare cases, the diagnosis of these two affections is not easy. The blood of hæmoptysis may come up into the mouth without the effort of coughing, and may seem to be vomited rather than coughed up. It may also be unmixed with sputa: and when discharged from old cavities of the lungs, may have remained long enough in the lungs to lose its bright vermilion hue. But the discharge of a very large quantity, such as a pint, or a quart, of dark grumous blood, even though unmixed with food, may be held to be conclusive of the blood having come from the stomach. When such large quantities are expelled from the lungs, the blood is always of a bright vermilion colour.

PROGNOSIS.—Hæmatemesis seldom proves fatal, though it often occasions great debility. When the hæmorrhage is symptomatic of some other disease, the prognosis must depend on the probability of that disease being cured.

TREATMENT.—In most cases, rest, a bland farinaceous diet, cold liquids, and small doses of blue pill, or of the hydrargyrum c. cretâ to act upon the liver, followed by gentle aperients, are sufficient to cure the disease. A single grain of blue pill, with a quarter of a grain of

opium, may be given twice or thrice daily, with a dose of some gentle aperient every morning.

When the hæmorrhage is excessive, the patient may be made to drink freely of iced-water, or to swallow rough ice, and pounded ice may be applied to the pit of the stomach.

When the hæmorrhage has ceased, we must endeavour to prevent its recurrence by a course of alteratives and aperients, and a strict attention to the digestion and general health.

When the disease is caused by suppression of the hæmorrhoidal or catamenial flux, leeches should be applied to the anus or vulva, together with other appropriate remedies for those diseases.

When the disease occurs in delicate or scorbutic habits, tonics and quinine, with the mineral acids, are indicated.

ULCER OF THE STOMACH.

SYMPTOMS.—A sense of weight, uneasiness, or slight pain, increased by pressure, in the pit of the stomach, coming on immediately on taking food, or after an interval of a few minutes, or of half an hour, or more; but in some cases continuing during the intervals of the meals, and relieved by food. There is also, in some instances, a throbbing sensation in the epigastrium, and a circumscribed pain in the back. The pain is generally relieved on assuming the recumbent posture, and is subject to increase from strong mental emotion and fatigue, from indigestible food, from hot fluids, and from alcoholic liquids. In young females the pain is often increased at the approach of the menstrual period. There is nausea and vomiting of food, of a clear sour liquid, of bile, or of blood. Sometimes the blood is discharged by the bowels. The bowels are generally constipated. The patient is emaciated, has an unhealthy aspect, and wears an expression of weariness and suffering.

TERMINATIONS.—In recovery; in death by perforation (see Perforation); by hæmorrhage followed by fatal syncope, or prolonged collapse; by marasmus from constant vomiting.

CAUSES.—*Predisposing.* Old age; the female sex; privation; intemperance; fatigue; anxiety. *Exciting.*—Obscure.

The influence of age on the occurrence of gastric ulcer may be thus briefly stated:—From 10 to 20 years of age, 20 cases; for each decade from 20 to 60, about 50 cases; for the two decades from 60 to 80, about 80 cases; and for the 10 years, from 80 to 90, 100 cases.

DIAGNOSIS.—From *dyspepsia* and *subacute gastritis* by the limited pain on pressure in the epigastrium; by the pain in the back, by the more frequent vomiting, and by the discharge of blood; from *pyrosis* and *gastralgia* by the pain and discharge of sour liquid coming on in *most cases sooner* after food; from cancer of the stomach, by the *shorter course of* the latter; by the coexistence of cancer in other

organs; by the marked cancerous diathesis; by the lancinating pain; by the presence of a hard and moveable tumour in the pit of the stomach; by the less abundant hæmorrhage; by the presence of microscopic cancer-cells in the matter rejected from the stomach. The diagnosis of ulcer of the stomach is often difficult and uncertain.

PROGNOSIS.—Favourable but guarded. Most guarded in cases of young females in whom perforation is a common event. About one in five cases may be expected to prove fatal in one of the ways mentioned above.

ANATOMICAL CHARACTERS. — Open ulcers of the stomach are present in about 1 dead body in 10, and scars in the like proportion. In more than a third of the cases the ulcer occupies the posterior surface of the stomach; and more than three-fourths occur on the posterior surface, on the lesser curvature, or near the pylorus. In about one-fifth of the cases there is more than one ulcer; and the number may amount to two, three, four, five, or more. "The ulcer is rarely much smaller than a fourpenny-piece, or larger than a crown-piece;" but it may attain a diameter of five or six inches. Its shape is usually round or oval, and it presents the appearance of "a shallow but level pit, with a sharp, smooth, vertical edge, as though it had been punched out;" but as the circular opening in the sub-mucous areolar tissue is smaller, and the aperture in the peritoneum, if the ulcer perforates, still more minute, the ulcer has the appearance of a cone. The mucous membrane and the areolar tissue are somewhat thickened by exudation of lymph, and the surrounding mucous membrane is sometimes inflamed. Perforation takes place in about 1 case in 8; this result being often prevented by adhesion to the pancreas, liver, spleen, mesentery, or diaphragm.

TREATMENT.—*Indications.* I. To promote the healing of the ulcer. II. To counteract occasional symptoms. III. To improve the state of the constitution.

I. The first indication is fulfilled by a strict regulation of the diet, to the total exclusion of solid food, and the substitution for it of bland farinaceous food with milk. The food should be given in moderate quantities, at comparatively short intervals; and the return to the ordinary diet should be made slowly and cautiously. Spirituous liquors and hot fluids should be forbidden.

II. If there is much *tenderness on pressure*, counter-irritants, such as mustard poultices or blisters, should be used; if constant *pain*, opium may be given in the crude form, or as the compound soap pill; if *gastrodynia and pyrosis*, the nitrate of bismuth in doses of ten grains, or one scruple; if distressing *vomiting*, the dilute hydrocyanic acid in doses of from three to five drops three times a-day; and farinaceous food in very small quantities often repeated; if *vomiting of blood*, small pieces of ice from time to time, and the remedies recommended under hæmatemesis; if constipation, castor-oil is the most suitable aperient; if *diarrhœa*, the compound kino powder in ten-grain doses.

III. If the patient is *anæmic*, the preparations of iron, of which the citrate, tartrate, or ammonio-citrate are to be preferred. (The citrate dissolved in glycerine is a good form for this purpose.) If there is much debility present, the mixed sulphate of quina and iron in glycerine is to be preferred. In intemperate persons, full doses of opium should be substituted for spirituous liquors.

[Consult Dr. Brinton's excellent work on Ulcers of the Stomach.]

PERFORATION OF THE STOMACH.

SYMPTOMS.—After a greater or less duration of symptoms of ulcer of the stomach, intense pain in the epigastrium occurring suddenly, spreading rapidly over the whole of the abdomen, and soon followed by great swelling and tympanites. The disease assumes all the characters of peritonitis, and usually proves fatal in from twenty-four to thirty-six hours. In some cases the fatal event is postponed in consequence of the peritonitis being of limited extent, or sub-acute in character. In most cases the rupture takes place during the distension of the stomach by a full meal, but it is sometimes occasioned by vomiting, straining at stool, coughing, or sneezing; by pressure, shocks, or blows.

TERMINATIONS.—In acute peritonitis and death in from twenty-four to thirty-six hours; in chronic peritonitis, and death after a more considerable interval; in abscess of organs bordering on the stomach, and opening in various ways; in gastric fistula.

CAUSES.—*Predisposing.* Those of the gastric ulcer. Females from the fifteenth to the twentieth and from that to the twenty-fifth year are very liable to this affection. Males are less subject to this accident; and the liability is greatest, and nearly equal throughout, from twenty to sixty years of age. *Exciting.*—Gastric ulcer; carcinoma; irritant poisons.

DIAGNOSIS.—From peritonitis due to other causes by the suddenness and intensity of the pain.

PROGNOSIS.—In the highest degree unfavourable, especially when the perforation takes place after a full meal.

TREATMENT.—The patient should be placed in the recumbent posture in a state of perfect rest. A full dose of opium, in the form of extract, or in the compound soap pill, should be administered at intervals of three or four hours. Complete abstinence from food must be enjoined, the patient being allowed merely to moisten the mouth from time to time. If the inflammation runs high, leeches should be applied to the abdomen, followed by warm fomentations. After the lapse of several days, the lower bowels may be relieved by small enemata, and nourishment may be supplied by the same channel; but purgatives by the mouth are contraindicated. Should the patient survive the immediate consequences of the rupture, milk and farinaceous

food must be given by the spoonful at short intervals, and a return to the usual diet must be made by slow and cautious steps. When convalescent, castor-oil should be given as an aperient, if necessary.

CARCINOMA, OR CANCER, OF THE STOMACH.

SYMPTOMS.—In the early stage of the disease the symptoms are very obscure. They are either those of dyspepsia, or of sub-acute gastritis. But, after a longer or shorter interval, during which the patient loses flesh, and obtains little or no relief from his dyspeptic symptoms, a circumscribed tumour is discovered in the epigastrium. At this stage of the disease, the symptoms are generally of a more marked character. The pain is described as burning, gnawing, or lancinating; and there are nausea; acid or bitter eructations; with constant vomiting of ingesta, of mucus, of blood, or of a dark grumous or sanious matter; constipation; great emaciation, and the hue and expression of countenance indicative of the cancerous diathesis.

ANATOMICAL CHARACTERS.—The disease may take the form of scirrhus, or of medullary or colloid cancer. But the most common form of the disease is that of scirrhus, and its most common seat the pylorus. The disease is identified by the discovery of the cancer-cells, (fig. 6, p. 91) under the microscope. The stomach is generally contracted when the disease occupies the cardiac extremity; greatly expanded and hypertrophied when the pylorus is affected.

DIAGNOSIS.—The only pathognomonic signs are the local tumour and the peculiar complexion of the patient. When the vomited matter resembles soot and water, or dark coffee-grounds, there is also a probability in favour of cancer. In advanced stages of the complaint, the extreme emaciation and the sanious discharges will assist the diagnosis. The disease, also, rarely occurs before forty. The part of the stomach which is affected may be generally inferred from the symptoms. When the cardia is the seat of the disease, the pain and vomiting come on immediately after taking food; when the pylorus is attacked these symptoms come on later.

CAUSES.—*Predisposing.* The cancerous diathesis. *Exciting.*—Long-continued dyspepsia. All causes of inflammation or congestion in the stomach. Depressing passions.

TREATMENT.—A bland and nourishing diet, such as new milk; milk thickened with arrow-root; the stronger soups thickened with arrow-root; jellies, and light farinaceous puddings; and tripe boiled in milk. The food should be taken frequently, and in very small quantities. Nutritive enemata should also be administered once or twice every day; and the skin may be anointed with oil. Leeches, to subdue occasional inflammation; narcotics and sedatives to allay pain; anodyne plasters, fomentations, and embrocations externally; and rest.

DISEASES OF THE INTESTINES.

ENTERITIS	Inflammation of the Intestines.
DIARRHŒA	Looseness of the bowels.
DYSENTERIA	Dysentery.
MELÆNA	Hæmorrhage from the Bowels.
TORPOR INTESTINORUM . .	Constipation.
COLICA	Colic.
COLICA PICTONUM . . .	Painters' Colic.
TYMPANITES	Drum Belly.
HÆMORRHOIS	Piles.
TABES MESENTERICA . .	Abdominal Consumption.
INTUS-SUSCEPTIO	Invagination of the Bowels.

ENTERITIS—INFLAMMATION OF THE INTESTINES.

SYMPTOMS.—Acute pain in the abdomen, increased by pressure, over the inflamed part of the intestine, and gradually extending to the whole abdomen; accompanied by swelling and tension. The patient lies on the back, with the knees drawn up, and can scarcely suffer the pressure of the bedclothes. There is obstinate costiveness; nausea and constant vomiting, the matters rejected being generally bilious, and, in some instances, highly offensive, and, in still rarer cases, stercoraceous; pyrexia; frequent, hard, contracted pulse; high-coloured urine; and great prostration of strength.

In fatal cases, the swelling and pain increase; hiccup sets in; the pulse becomes irregular; the extremities grow cold; the skin is bedewed with a cold sweat; the features are sharpened; and death takes place from exhaustion, preceded by a cessation of pain.

ANATOMICAL CHARACTERS.—Inflammation of the peritoneal coat of the intestines, generally involving the muscular coat and cellular tissue. Effusion of lymph and serum into the peritoneal sac.

TERMINATIONS.—*In resolution*,—known by *gradual* diminution of the symptoms, and free evacuation of the bowels. In *gangrene*, marked by a *sudden* cessation of pain and anxiety, the patient becoming calm and collected, while the countenance assumes a livid and cadaverous hue. In *ileus*,—from the formation of false membranes, or the permanent contraction of the intestines.

CAUSES.—Local irritation or obstruction, irritant poisons, incarcerated hernia, colic, ileus, indurated fæces.

DIAGNOSIS.—From *colic*, by the presence of fever; by the peculiar pulse above described; and by the pain being constant and increased by pressure. From English cholera, by the absence of diarrhœa.

PROGNOSIS.—*Favourable.* Gradual remission of pain and tenderness, or the pain changing its seat; the bowels open; a warm equable *sweat; the urine* depositing a sediment; the pulse becoming fuller, *softer, and less frequent.*

Unfavourable.—Increase of pain and tenderness; collapse; a sudden cessation of pain; hiccup and stercoraceous vomiting.

TREATMENT.—I. General and free blood-letting, followed by the application of leeches in large numbers to the part of the abdomen where the pain is most severe, the bleeding being encouraged by warm fomentations. Calomel and opium (two or three grains of the former with a grain of the latter) repeated at intervals of one, two, or three hours, for three or four times in succession, and followed, if the pain and tenderness have subsided, at an interval of one or two hours from the last dose, by a full dose of castor-oil. If the disease is not subdued by this treatment, the calomel and opium should be continued so as to affect the gums. Enemata of warm water should be administered, to remove any accumulation of fæces that may exist in the large intestines.

Enteritis may become chronic; in which case the antimonial ointment, or a blister, should be repeatedly applied to the abdomen.

When the peritoneal coat of the stomach and intestines is affected, the disease is called gastro-enteritis. It is never witnessed, except as the effect of irritant poisons. The symptoms are those of gastritis and enteritis combined.

REMEDIES.—Tobacco-smoke, or a weak solution of tobacco thrown up into the intestines. The use of strong purgatives—a practice to be strongly reprobated.

DIARRHŒA—LOOSENESS, OR PURGING.

SYMPTOMS.—Frequent discharges by stool, at first of fæces dissolved in mucus, afterwards of pure mucus, or of a watery fluid in greater or less quantity, accompanied by much griping, flatulence, and a sense of weight and uneasiness, nausea and vomiting. The pain in the abdomen is sometimes slightly increased by pressure. The tongue is either quite natural in appearance, or slightly furred. In chronic cases there is great emaciation.

CAUSES.—Cold applied to the surface; suppressed perspiration; depressing passions; the heat of the summer and autumn seasons; indigestible food; unripe fruits, or ripe fruits in excess; putrid substances; the abuse of active purgatives; previous constipation; worms; retrocedent gout or rheumatism; phthisis pulmonalis; typhus fever. Diarrhœa is a frequent precursor of Asiatic cholera.

DIAGNOSIS.—From *dysentery*, by the absence of inflammation, fever, and tenesmus; and of bloody and purulent stools.

TREATMENT.—When diarrhœa is recent, the treatment is extremely simple. If the motions are frequent, scanty, and accompanied by some degree of tenesmus, an ounce of castor-oil, combined with twenty drops of tincture of opium, is indicated. If the discharge from the bowels

is abundant, whatever may be its appearance and character, ten grains or a scruple of the pulv. cretæ C. c. opio may be given three times a-day, the patient's diet being restricted to gruel, arrow-root, or sago, made with or without milk, to the total exclusion of all solid matter. If the disease should not yield to this simple treatment, in one, two, or three days, the diet must be continued, and small doses of hydrargyrum c. cretâ must be given three times a-day, in combination with a few grains of Dover's powder, or of the pulvis cretæ C. c. opio. A single grain of hydrarg. c. cretâ, with from three to five grains of Dover's powder, or ten grains of the pulvis cretæ C. c. opio, is a sufficient dose. In the diarrhœa of children at the breast, from half a grain to a grain of hydr. c. cretâ, with a little sugar, or when the child is restless, with one or two grains of the pulvis cretæ C. c. opio.

This treatment is applicable to all forms of diarrhœa, except that which consists in a discharge of an abundant grumous matter, closely resembling coffee-grounds, and probably consisting of blood altered in its appearance and character. For this form of the disease, the remedy usually prescribed is sulphate of copper, in the dose of a quarter to half a grain, with from half a grain to a grain of opium every three or four hours. When this has failed, I have employed the nitrate of potash in ten-grain doses with the best effect. (G.)

The diarrhœa which accompanies ulceration of the mucous membrane of the intestines, and which is so distressing a symptom of the advanced stages of phthisis pulmonalis, is often removed by the regulation of the diet, and the administration of small doses of hydrarg. c. cretâ. If these fail, sulphate of copper, in doses of one-sixth or one-fourth of a grain, with a fourth of a grain of opium three or four times a-day, may be given with great advantage.

If there should be much tenderness of the abdomen on pressure, leeches, followed by warm fomentations, will be necessary; if much griping, starch injections with opium will be useful; if sudden debility and faintness, brandy added to the farinaceous diet.

Remedies.—Chalk, kino, alum, decoction of logwood, simaruba, liquor calcis, the aromatic confection, tannin, and the sulphates of zinc and copper. Dilute sulphuric acid in doses of from half a drachm to a drachm. Calomel and blue-pill, with or without opium,—an unnecessary and often mischievous treatment.

DYSENTERIA—DYSENTERY.

Synonyms.—Colitis. Bloody flux. The scourge of armies.

Definition.—A specific inflammation of the mucous membrane of the colon, accompanied by tenesmus, and mucous, bloody, or purulent discharges, and often traceable to marsh miasma.

Symptoms.—The disease sometimes comes on with cold shiverings, *followed by fever*; at others, it sets in with bilious diarrhœa, which,

after continuing for a few days, without causing much pain or uneasiness, becomes an incessant flux, with discharge of pure blood, of mucus, or of a white glairy matter, like white of egg, mixed with blood. Masses of indurated fæces are likewise sometimes passed by stool. At the same time, there are severe griping pains in the abdomen; frequent inclination to go to stool; tenesmus; dysuria; and cramps in the thighs. The patient is restless, sleepless, and anxious, but the mind is unaffected, and there is no headache. The pulse is quick and hard, the tongue clean, the skin warm and moist, the face flushed, and the eye bright.

In this, the first stage of dysentery, the disease sometimes proves fatal, with symptoms of collapse; but more commonly the disease assumes the chronic form, the discharges continuing of the same character for a considerable period, or it passes into the second stage, characterised by the appearance of pus in the stools. In the second stage, the pus discharged is sometimes small in quantity, but often very abundant, and it is either passed by itself, or mixed with blood, shreds of lymph, and fæces, or with a putrid and highly offensive sanies. The sufferings of the patient become still more severe, various new symptoms show themselves, and the patient dies weak and emaciated, and worn out by complicated sufferings.

COMPLICATIONS.—The disease may accompany, precede, or follow ague, remittent, or typhus fever; and may be complicated with inflammation of the liver, spleen, or pancreas.

TERMINATIONS.—In incessant vomiting; in aphthous inflammation of the mouth; in abscess of the liver; in ascites; in rupture of the bowels; in gangrene; in collapse.

ANATOMICAL CHARACTERS.—The mucous membrane of the colon inflamed in patches of a deep-red colour, or throughout its whole extent; sometimes black, as if gangrenous; sometimes softened, sometimes of preternatural hardness. The intestine itself contracted. The mucous follicles enlarged and transparent, or hard and opaque. In the advanced stage of the disease, ulceration of the large intestines, either in small round patches, or throughout the whole extent. In some cases, similar appearances in the lower part of the small intestines, and occasionally even in the stomach. The mesenteric glands often red, swollen, and soft. The intestines contain, in the early stage, mucus, blood, and a watery lymph; in the advanced stages, pus mixed with blood.

CAUSES.—*Predisposing.* A high temperature. Unwholesome food, especially salt meat and unripe fruit; fatigue, privation, and exposure. Intemperance. *Exciting.*—Exposure to wet and cold, especially at night after a hot day. A debauch. A specific contagion.

DURATION.—From a few days to several weeks or months.

MORTALITY.—In acute dysentery from 1 in 8 to 1 in 50; in chronic dysentery, from 1 in 4 to 1 in 6.

DIAGNOSIS.—From diarrhœa by the scanty evacuations mixed with blood or pus. In the ascertained absence of fistula, the purulent stools are pathognomonic.

PROGNOSIS.—*Favourable.* The stools becoming yellow and less frequent; the strength little impaired; sediment in the urine. The patient coming under treatment at an early stage.

Unfavourable.—Violent and distressing tenesmus and tormina; vomiting; hiccup; aphthæ; difficult deglutition; convulsions; cold extremities; delirium; cold and partial sweats; the tongue preternaturally red and dry; the pain suddenly ceasing; great prostration of strength; the motions extremely fetid; petechiæ; involuntary evacuations; intermitting pulse; the disease being complicated with or supervening upon others, such as affections of the liver, and intermittent, remittent, or typhus fever.

TREATMENT.—In robust persons, and where there is much fever, with full and hard pulse, general blood-letting may be resorted to; but it is a remedy which must be used with great caution. As a general rule, and in less severe cases, leeches to the tender spots of the abdomen, followed by warm fomentations. Opium in the solid form, or in the shape of Dover's powder, combined with small doses of calomel, blue pill, or hydrarg. c. cretâ, to act upon the liver, may be given in full doses every one, two, or three hours, according to the severity of the symptoms, and followed at intervals by an ounce of castor-oil. Two or three ounces of starch, with half a drachm of laudanum, or a suppository of one or two grains of opium may, at the same time, be introduced into the rectum. The strength should be supported by light preparations of barley, rice, sago, arrowroot, flour, panada, and gelatinous broth; but all solid food should be proscribed.

Neither general nor local blood-letting is required in this country, except in very rare cases; a full dose of castor-oil, with ten or twenty drops of laudanum, and a regulated diet, being generally sufficient.

These means will be found inadequate to the cure of chronic dysentery, if a dusky sallow hue of countenance, tenderness upon pressure in the region of the liver, and a clayey appearance of the fæces manifest the presence of a diseased and obstructed state of the liver. In such cases it is usual to recommend *mercury*, so given as to keep up a gentle affection of the mouth until the symptoms begin to yield.

As the evidence bearing on the treatment of dysentery is very conflicting, it will perhaps be allowable to prescribe a treatment founded on the nature of the disease. The first object to be accomplished is the removal of the solid contents of the bowels by full and free doses of castor-oil combined with from ℈i. to ʒss. of Tinct. Opii. Two or three such doses might be given with advantage, on two or three successive mornings. At the same time a diet should be prescribed free from solid ingredients, but more or less nourishing according to the state of the patient, with an allowance of port wine in cases of great debility. Tender spots in the abdomen should be treated with a few leeches, *followed by* warm fomentations; and tenesmus and dysuria by sup-

positories of the compound soap pill, or small injections of gruel containing laudanum. From the favourable effect of nitrate of potass in doses of ten grains frequently repeated in a very troublesome and intractable form of diarrhœa, I should be disposed to recommend ten grains of this salt with a grain of opium and a grain of ipecacuanha three or four times a-day. (G.)

PROPHYLAXIS.—Warm and dry clothing; cleanliness; a mixed and wholesome diet; avoidance of exposure to wet, cold, and fatigue; prompt change of wet clothing. In the case of armies, a frequent change of the site of the camp.

REMEDIES.—Emetics; ipecacuanha in small and repeated doses; large doses of opium (℈i. in twenty-four hours); acetate of lead with opium; injections of iced water, assafœtida, turpentine, tobacco; quinine; salicine (in five-grain doses); balsam of copaiba; decoction of cusparia, combined with nitric acid and laudanum; leeches to the anus; strychnine; sulphate of copper, with or without opium. In chronic cases, tonics and astringents; an aqueous solution of opium, nitrate of silver, sulphate of zinc, the black wash, or superacetate of lead injected into the bowels; suppositories of opium (one or two grains); decoction of logwood; a decoction of the pomegranate; tannin, &c. Warm baths; calomel in doses of ℈i. or ʒss.

MELÆNA—HÆMORRHAGE FROM THE BOWELS.

This disease consists in the discharge of dark-coloured blood from the bowels. It commonly occurs in persons subject to chronic dyspeptic complaints, and especially to disorders of the liver. Like hæmatemesis, it attacks those of a cachectic habit. It may occur alone, or in combination with hæmatemesis. It is also, in rare cases, combined with diarrhœa. It is seldom attended with pain, or with severe constitutional symptoms.

DIAGNOSIS.—From *hæmorrhoids* by the darker colour and larger quantity of the blood, and by the absence of soreness and tenesmus.

TREATMENT.—That of hæmatemesis; namely, small doses of the hydrarg. c. cretâ, or of blue pill, with opium or Dover's powder (Hyd. c. cretâ, or pil. hydrarg. gr. i., Pulv. opii. gr. ¼, three times a-day), with an occasional dose of castor-oil in the morning. A bland or mucilaginous diet should at the same time be prescribed.

TORPOR INTESTINORUM—CONSTIPATION.

The causes of constipation are either structural or functional.

The *structural* causes either narrow the intestines or entirely obliterate the passage. In the one case, purgative medicines act, though

with difficulty; in the other case, the mechanical impediment must be first removed.

Among the *functional* causes of constipation, are the absence of irritating matter from the diet, a deficiency of bile, want of proper exercise, spasmodic action of the muscular fibre, or paralysis of some part of the gut.

The *treatment* of constipation, due to alteration of function, will depend upon the character of that alteration. If the food is deficient in indigestible matter, we must supply it by brown bread or ripe fruits; if the bile is wanting, we must stimulate the secretions of the liver by mercurial preparations in small doses; if the habits are sedentary, we must enjoin proper exercise. The other functional disorders will be noticed under the head of Colic.

Habitual constipation is best treated by aloetic purgatives; by the compound rhubarb, or compound colocynth, pill, with small doses of the extract of conium. When the torpor of the bowels is still greater, and especially where there is a large accumulation of hardened fæces, purgative enemata are required, consisting of gruel with castor-oil, oil of turpentine, or Epsom salts. If the enemata return without bringing any scybalous matter away, a large quantity of warm water, or of air, should be injected through a long flexible tube introduced into the sigmoid flexure of the colon.

A stream of cold water poured from a height on the abdomen has sometimes relieved obstinate constipation. When the stomach is irritable, croton-oil may be rubbed into the skin of the abdomen or inside of the thigh.

The management of constipation alternating with diarrhœa requires some care. When diarrhœa is present, purgatives should be omitted, and not be resumed till it has ceased. This caution is especially necessary in nervous diseases; for these diseases are as much relieved by gentle aperients as they are increased by hypercatharsis.

In obstinate constipation careful inquiry should be made after mechanical obstructions, such as hernia, or intus-susceptio.

COLICA—COLIC.

SYMPTOMS.—Severe pain in the abdomen, with retraction of the umbilicus, and a peculiar sense of twisting, occurring in paroxysms, and relieved by pressure; obstinate costiveness; flatulence; nausea and vomiting; with a pulse little increased in frequency.

These symptoms may subside after the operation of a purgative, or they may continue to increase in severity, the pain becoming more fixed, and increased by pressure, the constipation more obstinate, the vomiting more urgent, the matters discharged sometimes consisting of bile, and more rarely of stercoraceous matter. Symptoms of local inflammation follow, and these, if not subdued, generally terminate in gangrene, indicated by the subsidence of the pain, frequent hiccup, *prostration, cold* sweats, and the facies Hippocratica.

CAUSES.—Cold applied to the surface of the body, especially to the lower extremities and abdomen; austere, acrid, or indigestible aliment; redundance of acrid bile; collections of indurated fæces, or of calcareous concretions, in the alimentary canal; flatus; certain metallic poisons, as lead; hysteria; translation of gout, the imprudent use of astringents in diarrhœa and dysentery; worms.

ANATOMICAL CHARACTERS.—Death rarely takes place from simple colic. The intestines, if free from mechanical obstruction and consequent inflammation, are found firmly contracted in one part, and extremely distended in that immediately adjoining it; the muscular fibre of the contracted portion being in a state of spasm, whilst that of the distended part is paralysed.

DIAGNOSIS.—From *enteritis*, by the peculiar twisting pain and retraction of the navel; by the absence of fever; and by the pain being alleviated by pressure. From muscular pains of the abdomen by the effect of percussion with the points of the fingers. This produces sudden and severe pain when the muscles are affected, but not in colic. In muscular pain, too, the sudden removal of pressure causes acute suffering.

PROGNOSIS.—*Favourable.* The pain remitting or changing its situation; the discharge of wind and fæces, followed by an abatement of symptoms. *Unfavourable.*—Violent fixed pain; obstinate costiveness; sudden cessation of pain, followed by hiccup, great watchfulness, delirium, syncope, cold sweats, weak tremulous pulse; the pulse becoming peculiarly hard (see Enteritis); and the pain, before relieved, being now much increased, upon pressure.

TREATMENT.—Having ascertained that there is no concomitant inflammation, and no mechanical obstruction which can be detected—and, at the same time, that the pain is not merely muscular—two or three grains of calomel, with half a grain or a grain of opium, according to the previous duration of the constipation and the severity of the symptoms, should be given every one or two hours for three or four times in succession; the last dose being followed by an ounce of castor-oil. If the bowels are not relieved by this treatment, a large clyster of thin gruel containing a drachm of the tincture of opium may be thrown up, either by means of the common clyster-pipe or through the flexible tube. Should the bowels still continue unrelieved, and there are still no symptoms of inflammation, the patient should be kept under the influence of opium till a free evacuation takes place. The pain may in the mean time be relieved by fomenting the abdomen with flannels wrung out of hot water or the poppy fomentation; or by steady pressure.

It is not unusual in cases of colic to find, on inquiry, that one of the first symptoms was the discharge of a quantity of gelatinous mucus from the bowels. In such cases, there is commonly more or less tenderness in some part of the abdomen, especially in the right

iliac fossa, and from six to twelve leeches, followed by a warm bread-and-water poultice, should be applied to the tender spot. (G.)

Flatulence may be relieved by the introduction of the long flexible tube, which may also be advantageously employed to throw up warm water into the bowels.

In spite of the persevering employment of these means, six or seven days will sometimes elapse before the bowels can be made to act.

For the removal of mechanical obstructions, the remedies appropriate to those obstructions. (See Intus-susceptio.)

COLICA PICTONUM—LEAD COLIC.

SYNONYMS.—Colic of Poictou. Painters' colic. Saturnine colic. Devonshire colic.

SYMPTOMS.—Those of colic from other causes, the pain generally coming on more gradually, and being often accompanied with pains in the limbs, or with weakness, or complete paralysis, of the hands or forearms.

DIAGNOSIS.—From common colic, by the history of the case and the employment of the patient; and generally by the blue line at the margin of the gums indicating the action of lead on the system.

PROGNOSIS.—Favourable. Five fatal cases in 500. (Andral.)

TREATMENT.—Calomel and opium in successive doses, followed by a full dose of castor-oil (Hyd. chloridi gr. iii., Pulv. opii gr. i., every hour for three successive hours, followed after an interval of another hour by an ounce of castor-oil). Enemata of warm water, thrown up by means of the long flexible tube, with hot fomentations or the warm bath; and when the pain is extremely severe, and increased by firm pressure, leeches to the abdomen. (See Colic.)

PROPHYLAXIS, see Lead Palsy, p. 424.

TYMPANITES—DRUM BELLY.

SYMPTOMS.—The abdomen distended, tense, elastic, and painful, and sounding, on percussion, like a drum or bladder filled with air. The air is, in almost all cases, contained in the stomach and intestines, its most common seat being the arch and sigmoid flexure of the colon. In very rare instances air passes into the sac of the peritoneum, in consequence of ulceration of the bowels. Tympanites is of common occurrence in typhoid fever, and is then styled "meteorismus."

CAUSES.—*Loss* of tone in the intestinal canal; errors in diet;

excessive use of purgatives; abuse of warm liquids and of spirituous liquors; a crude vegetable diet; hysteria.

DIAGNOSIS.—From *ascites*, by the clear sound, and the absence of fluctuation.

TREATMENT.—In mild cases of flatulent distension of the bowels, the remedies usually resorted to are essence of ginger with hot water, or brandy and water swallowed as hot as it can be readily borne. In severe and obstinate cases the distension is best relieved by the introduction of a long elastic tube into the bowels, followed by the injection of an ounce of turpentine in half a pint of gruel.

Persons subject to tympanites should carefully avoid the use of food known to occasion flatulence.

HÆMORRHOIS—THE PILES.

SPECIES.—1. External. 2. Internal.

1. EXTERNAL PILES.

DEFINITION.—Small round tumours, situated at the verge of the anus, and covered with skin or mucous membrane, or painful folds of skin. The tumours either discharge blood, when they are called *bleeding piles*, or they do not bleed, when they are called *blind piles*. When free from pain they are called *indolent*.

SYMPTOMS.—When piles are in an inflamed state they occasion heat, itching, and pain, with a sense of weight and tension, increased upon going to stool, which generally occasions a discharge of blood. The inflammation sometimes runs on to suppuration. In mild cases, piles appear and disappear, and are often absent for long periods of time.

2. INTERNAL PILES.

SYMPTOMS.—A sensation as of a foreign body in the rectum, with frequent desire to relieve the bowels, and painful strainings, accompanied by discharges of blood. In the more severe cases, dysuria, pain in the back and down the thighs, and, in females, uterine irritation.

CAUSES.—Luxurious and sedentary habits; habitual costiveness; plethora; hard riding; excesses of various kinds; the suppression of some long-accustomed evacuation; the habitual use of strong aloetic purgatives; pressure of the abdominal viscera on the hæmorrhoidal veins; pregnancy.

DIAGNOSIS.—From fissure of the anus by the appearance on inspection.

PROGNOSIS.—The discharge of blood by piles is often salutary, especially in persons advanced in life, and their suppression may be followed by apoplexy, or by more serious hæmorrhage from other parts.

TREATMENT.—The treatment of piles is—I. General. II. Local.

I. Of the general treatment the indications are—a. To promote the

circulation of blood through the abdominal vessels. *b.* To keep the bowels free.

a. The first indication is fulfilled by the avoidance of sedentary habits, by active exercise, and by abstemious living.

b. The bowels to be kept free by gentle aperients, such as the senna or sulphur electuary, rhubarb and magnesia, the compound rhubarb pill, or small doses of blue pill, followed occasionally by castor-oil. The confectio piperis C. (Ward's paste) may be given in the dose of a tea-spoonful three times a-day.

II. The *local* treatment consists in the strict observance of cleanliness, washing with cold water after each motion, and the careful return of the piles, if, being internal, they protrude during the evacuation of the bowels; in the use of astringent washes or ointments (such as the zinc lotion, the liq. plumbi diacetat., the unguentum gallæ, or an ointment consisting of pulv. Hellebori nigri ʒi. to ℥i. of lard); and when the piles are inflamed, in the application of leeches, followed by cooling lotions.

Bleeding piles also require the use of cold astringent applications and injections. Daily injections of cold water are highly beneficial. When the hæmorrhage is profuse, astringents may be given internally. The best are the acetate of lead with an excess of acetic acid and opium. The hæmorrhage, when very profuse, must be treated by pressure with dossils of lint.

Piles, strangulated by the spasm of the sphincter ani, must be compressed with the finger and passed into the rectum; the operation being facilitated by the use of the warm bath. A T bandage may become necessary.

When the tumours close the anus, a common candle, an oiled bougie, tents, or a piece of sponge well oiled, will have to be introduced from time to time.

When these means fail, the tumours may be removed by excision.

PROPHYLAXIS.—Patients affected with piles should sleep on a hair mattress, sit as little as possible, and if sedentary or literary, pursue their avocations in an erect posture.

TABES MESENTERICA—ABDOMINAL CONSUMPTION.

DEFINITION. — A tubercular or scrofulous degeneration of the mesenteric glands, sometimes occurring without any disorder of the alimentary canal, but, in the majority of cases, following upon long-continued irritation or ulceration of the mucous membrane of the intestines.

SYMPTOMS.—These are extremely obscure, when the disease is idiopathic; but when it is the result of disease in the intestinal canal, is characterised by the symptoms of infantile remittent fever (p. 358). The *only certain* sign of this complication is the enlargement of the *glands felt through* the parietes of the abdomen.

CAUSES.—*Predisposing.* The scrofulous or tubercular diathesis; the age of infancy and childhood; improper food; bad air.

Exciting.—Irritation of the mucous membrane of the intestines from scybala, from worms, or from improper food.

TREATMENT.—This will depend upon the existing complications, and on the condition of the bowels which has preceded and produced it. Purgatives regularly and perseveringly administered in constipation; a strict regulation of the diet, with small doses of hyd. c. cretâ and opium (hyd. c. cretâ gr. ½ to gr. i. pulv. cretæ C. c. opio gr. ii. to gr. v. according to the age), in diarrhœa; food adapted to the age and strength of the child; and, where great debility and emaciation are present, cod-liver oil and tonics;—the treatment, in fact, of infantile remittent fever. (See p. 359.) Nourishing and stimulating food, under the supposition that the strength of the patient requires support, is contraindicated. A bland farinaceous diet is that best adapted to the recovery of the patient. The affection of the glands requires gentle friction with oil or stimulating liniments two or three times in the day. In extreme cases, iodine ointment may be used for this purpose. The treatment of infantile remittent fever, aided by friction to the abdomen, will often remove considerable enlargement of the mesenteric glands, and restore the patient to perfect health. As these glandular enlargements occur in children of a tubercular diathesis, the chest should be carefully attended to, and if the patient recover, directions should be given for a close attention to his future health.

INTUS-SUSCEPTIO.

SYMPTOMS.—After violent straining at stool, a sudden attack of severe colic, followed by constant desire to go to stool, violent tormina and tenesmus, discharge of a small quantity of bloody mucus and the symptoms of enteritis. These symptoms are not decisive; but the existence of the disease becomes more probable after the failure of attempts to evacuate the bowels, and the supervention of hiccup and stercoraceous vomiting.

ANATOMICAL CHARACTER.—One portion (from a few lines to more than a foot in length) of the intestines enclosed within another. In most cases there is only one of these invaginations, but in some instances there are several. The most common seat of the obstruction is the junction of the small with the large intestines; but it may take place in any part of the small intestines, and in the arch of the colon. A natural cure is sometimes effected by adhesion, suppuration, gangrene, and separation of the enclosed portion of intestine.

DIAGNOSIS.—Symptoms of obstruction of the bowels occurring suddenly, and followed by a perceptible tumour in the abdomen, would give reason for suspecting the existence of this disease. The discovery

of a portion of the intestinal tube in the evacuations from the bowels would furnish conclusive evidence.

PROGNOSIS.—Very unfavourable. In a few cases relief is given by remedies, and in a few cases also recovery takes place after sloughing of the constricted portion of intestine.

TREATMENT.—*Indications.* 1. To subdue any existing inflammation. 2. To palliate the sickness. 3. To remove the obstruction.

I. If there is decided tenderness in any part of the abdomen, leeches must be applied to the tender spot, followed by warm poultices, or warm fomentations. If inflammation runs very high, and there is much inflammatory fever, venæsection may become necessary.

II. The distressing vomiting which accompanies obstruction of the bowels is best relieved by small quantities of liquid in a state of effervescence. Creasote (one drop added to each dose of medicine, or draught of liquid) has also been recommended for this purpose. Opium in the solid form, or in the form of tincture, should also be given at short intervals, with a view of moderating the peristaltic action.

III. When the cause of the obstruction is still doubtful, trial may be made of the treatment proper to colic. Three grains of calomel, with a grain of opium, may be given every hour, and after an interval of another hour from the last dose of calomel and opium, an ounce of castor-oil. If the bowels still remain costive, a large quantity of warm water should be thrown up into the bowels by the long elastic tube; and if the progress of the tube is obstructed at any point of the large intestines, an effort should be made to overcome the resistance by moderately firm pressure, aided by the liberal injection of warm water. Should this fail, a further attempt at removing the obstruction should be made by injecting air. This treatment may be repeated at intervals, till the bowels are relieved, or till the attempt to obtain relief in this way seems hopeless. After the failure of all these attempts, the mechanical remedies recommended for removing the obstruction may be resorted to; or an operation may be performed, the sac of the peritoneum being opened, and the intestine unravelled.

REMEDIES.—Crude mercury (from one to three pounds) swallowed. Small shot administered in the same way. Tobacco injections.

OTHER CAUSES OF OBSTRUCTION OF THE BOWELS.—Intus-susceptio is only one of several forms of mechanical obstruction leading to the symptoms usually designated as *ileus* or *volvulus*, symptoms which also occur in the more severe cases of colic, in the absence of permanent causes of obstruction. There are also other causes of obstruction within the bowels themselves, which often prove very difficult of removal, such as impacted and hardened fæces, and solid concretions formed by indigestible and insoluble matters swallowed in large quantities. The chief permanent causes of obstruction are twisting of the bowels, adhesion of the peritoneum, organised bands of lymph, tumours formed external to the intestines, and cancerous degenerations of the *intestines themselves.* The treatment, supposing that we are ignorant *of the exact nature* of the obstruction, will be that prescribed above.

DISEASES OF THE STOMACH AND INTESTINES.

Gastro-Enteritis Mucosa .	English Cholera.
Cholera Maligna . . .	Malignant Cholera.

GASTRO-ENTERITIS MUCOSA—ENGLISH CHOLERA.

Symptoms.—Nausea, pain, and distension of the stomach and intestines, succeeded by vomiting, and by purging of bilious or feculent matter, and, when this has been discharged, of mucus. The tongue is furred; the pulse is frequent, small, and sometimes unequal; and there is much thirst. In rare cases death takes place within the space of twenty-four hours, after hiccup, cold sweats, great anxiety, blueness of the surface, and painful cramps of the extremities.

Causes.—Excessive heat, or sudden transitions from heat to cold; the summer and autumnal seasons; food of difficult digestion; unripe fruit, or an excessive quantity of ripe fruit; putrid meat; decayed vegetables; violent purgatives; irritant poisons; catarrh.

Diagnosis.—From diarrhœa by the coexistence of vomiting. The disease in its most severe form does not admit of being distinguished with certainty from Asiatic cholera.

Prognosis.—*Favourable.* A gradual diminution of the symptoms, especially of the vomiting, succeeded by sleep, or a gentle moisture on the skin. The disease, when protracted to the third or fourth day, seldom proves fatal. *Unfavourable.*—Painful cramps of the extremities; convulsions; great prostration of strength; cold, clammy sweats; anxiety; great distension of the abdomen; short hurried respiration; continual hiccup; intermitting pulse.

Treatment.—A restriction of the diet to farinaceous substances, to the entire exclusion of solid food, is generally sufficient to effect a cure. A scruple of the compound chalk and opium powder, or a mucilaginous mixture, with twenty drops of tincture of hyoscyamus, may be given at the same time, three or four times a-day. When there is great prostration of strength, full doses of opium, with stimulants, are indicated, with warmth to the surface, and mustard sinapisms to the extremities.

When the disease has subsided, the usual diet must be gradually resumed, and a course of tonic medicines may be prescribed.

CHOLERA MALIGNA—MALIGNANT CHOLERA.

Synonyms.—Cholera morbus; epidemic, spasmodic, Indian, Asiatic, blue, pestilential, cholera. Cholerine—a term applied to the milder forms of the disease. Cholera asphyxia—a term used to characterise the state of collapse in fatal cases.

DEFINITION.—An epidemic malady due to an atmospheric poison but communicable by infection, characterised by symptoms of collapse allied to asphyxia, and by profuse vomiting and purging.

SYMPTOMS.—The disease does not always begin in the same way. In a few cases it makes its attack suddenly: the patient vomits once or twice, or passes one or two loose motions, complains of giddiness, blindness, or deafness, falls down, and expires in a few minutes. In another and larger class of cases the disease shows itself after two or three days of slight indisposition, with depression of spirits, loss of appetite, oppression at the præcordia, rumbling in the bowels, giddiness, noises in the ears, and twitchings in the limbs. In a still larger class of cases the fully-formed disease sets in after a preliminary attack of diarrhœa of some hours' or days' continuance. The first class of cases is rarely seen out of India.

In the majority of cases, both in India and in this country, the following is the order of the symptoms: after a preliminary attack of diarrhœa, of greater or less severity, and continuing for some hours or days, the patient is seized with symptoms of collapse, accompanied, in most cases, by vomiting. The acts of vomiting and purging are generally unattended by pain or tenderness in the abdomen; and the matters rejected from the stomach and bowels are free from bile, have a faint fishy odour, or are altogether inodorous, and resemble yeast, or they consist of a thin colourless serum, or they bear a close resemblance to rice-water, and are familiarly known as "rice-water evacuations." Sometimes they have a pink colour, or the deeper hue of port wine. Severe and painful cramps commence in the fingers and toes, and rapidly extend to the calves of the legs, to the thighs, and muscles of the abdomen; the eyes are sunk, and surrounded by a dark circle; the features contracted and sharpened; the expression of countenance indifferent and apathetic; the face, extremities, and sometimes the whole surface of the body, assume a leaden, bluish, or purple hue; the limbs are shrunk and contracted; the nails blue; the hands clammy and sodden; the surface covered with a profuse cold sweat; the pulse thready or imperceptible at the wrist, arm, axilla, temple, or neck; and if a vein or artery is opened, the blood trickles away, thick and dark. In spite of the extreme coldness of the surface, the patient complains of heat, throws off the bedclothes, and suffers from great restlessness and incessant jactitation, complains of a burning heat in the epigastrium, and is tormented with thirst; the respirations are below the number in health, the inspiration difficult, and the expiration short and convulsive; the voice is plaintive, the patient speaking in a hoarse, sepulchral whisper; the breath feels cold as it issues from the mouth; the tongue is white, or of a leaden colour, cold and flabby; the temperature often as low as 79° or 77°, and even 72°. The secretion of urine is entirely suppressed, or a small quantity of limpid urine is passed, and there is an earthy or cadaverous odour exhaled by the body. In this state of collapse the disease often proves fatal, the patient dying without a struggle, and retaining his faculties to the last. In other cases the patient gradually rallies, the pulse rises, the

blueness of the surface disappears, the body resumes its warmth, the cramps and vomiting cease, bile appears in the motions, the secretion of urine is restored, and a rapid and complete recovery takes place. But in a third class of cases the improvement is partial and temporary, and the patient falls into a state of fever closely resembling the typhoid stage of continued fever, from which he may recover after several days, but which more frequently proves fatal.

TERMINATIONS.—In sudden death; in death after severe primary or secondary symptoms; in recovery; in prolonged gastric irritation; in secondary fever, of the typhoid character, and often accompanied by a rash resembling urticaria febrilis.

MORBID ANATOMY.—The alimentary canal filled with a white flaky liquid; the mucous membrane as if sodden with the same, and greatly congested in patches; all the glands of the intestines large and prominent; the veins and arteries loaded with dark blood; the lungs gorged in some cases, extremely contracted in others; the liver and gall-bladder gorged with bile; the kidneys congested; the urinary bladder strongly contracted and empty. In patients who survive the stage of collapse, and die after the secondary fever, the morbid appearances are those present in cases of typhus.

DURATION.—In fatal cases, from a few minutes to twelve hours or more. More than half the fatal cases die within the first twenty-four hours; nearly a sixth of the cases within six hours. The average duration is about two days. The duration of the cold stage varies from a few minutes to forty-eight hours or more, while that of the febrile stage may extend from four to ten days or more.

MORTALITY.—At the onset of the epidemic nine-tenths of the cases; on the average about one-half of the cases; at the decline a small fraction. Deaths from cholera in England and Wales, in 1831–32, 30,924; in 1848–49, 54,398: in 1853–54, 24,516. Deaths in London, in a million of inhabitants, 4,269 in 1854, and 6,209 in 1849.

CAUSES.—*Predisposing.* Debility; impaired health; intemperance; impure air; impure water; low and damp situations; the summer and autumn seasons. *Exciting.*—A peculiar poison diffused through the atmosphere. There is also reason to believe that the disease spreads by contagion, though the contagion is not so intense as to cause anxiety among the attendants on the sick; and by means of water polluted by cholera-evacuations.

DIAGNOSIS.—From *English cholera*, by the absence of bile from the matters rejected from the stomach and bowels, which resemble rice-water, and have a peculiar odour; by the early occurrence and intense degree of collapse, and by the great mortality. The complete suppression of urine, the intense blueness of the surface, the hoarse, feeble voice, and the shrunken appearance of the countenance, are other diagnostic signs of this disease. But these diagnostic marks will not

serve to distinguish the disease from the more severe cases of English cholera. The diarrhœa, which forms the premonitory symptom of cholera, is distinguished from ordinary diarrhœa by the absence of pain.

PROGNOSIS.—*Favourable* in the early stage before collapse has set in, and in the secondary stage when the febrile symptoms are slight, and the type of the fever remittent or intermittent; *unfavourable* during the stage of collapse, and in the secondary fever when it assumes the typhoid character. *Favourable Symptoms.*—Cessation of cramp; subsidence of vomiting and purging, and the reappearance of bile in the motions; voiding of urine; return of the pulse; restoration of heat in the extremities and surface of the body; disappearance of the blueness of the skin and of the facies Hippocratica. *Unfavourable Symptoms.*—Extreme collapse; absence or cessation of vomiting and purging in the stage of collapse; deafness; the evacuations of the colour of port wine. Advanced age, previous debility, or ill health, and previous habits of intemperance, are unfavourable circumstances, and the disease is somewhat more fatal in females than in males.

TREATMENT.—I. Of the preliminary diarrhœa. II. Of the stage of collapse. III. Of the stage of reaction.

I. The preliminary diarrhœa requires the treatment of common diarrhœa. In the ordinary run of cases, a scruple of the compound chalk and opium powder may be given three or four times a-day, the diet being at the same time restricted to gruel or arrow-root, made with milk. In more severe cases, grain-doses of opium may be given every hour, or every two or three hours. Where the patient is in a weak and exhausted state, brandy may be administered from time to time. In epidemics of Asiatic cholera, patients suffering from diarrhœa should be promptly treated and carefully watched.

II. The stage of collapse is best treated by large draughts of salt and water (in the proportion of three table-spoonfuls of common salt to a quart of water), repeated every quarter of an hour till reaction is established. A scruple of chlorate of potash might perhaps be advantageously added to each quart of the solution. At the same time reaction should be promoted by warm blankets, bottles of hot water to the feet and epigastrium, and assiduous friction. The patient may be allowed to drink freely of water at the temperature of the apartment. The cramps may be relieved by forcible extension of the parts affected. The treatment by castor-oil, in the dose of a table-spoonful repeated at short intervals, so as to act both as an emetic and purgative, may be substituted for the treatment by emetics.

III. Reaction having been established, the treatment must be guided by the symptoms actually present. The thirst may be assuaged by large draughts of water; diarrhœa, if it exist, may be met by opium in doses of one grain, repeated at short intervals, or by a strong decoction of logwood in combination with laudanum and aromatic spirits of ammonia; and the warmth of the skin may be kept up by frictions and warm applications. In the absence of diarrhœa, the bowels should be relieved by occasional doses of castor-oil.

If the reaction is excessive, and assumes the form of fever, it must be treated as common continued fever; and if it assume the typhoid type, by the remedies appropriate to that condition.

PROPHYLAXIS.—Temperate habits; the observance of the rules of health; the moderate use of wholesome vegetables and ripe fruits; the early treatment of diarrhœa; and the use of tonic or other medicines adapted to the existing state of system in persons complaining of indisposition when cholera is prevailing. Those persons who are able to do so, should remove from low-lying districts to high grounds. Strangers should avoid visiting infected places. Persons supplied with drinking water from sources of doubtful purity should drink only water which has been previously boiled. On the approach of cholera, the authorities should cause visits to be made from house to house in search of cases of diarrhœa, and should make arrangements for the prompt treatment of such cases. They should also adopt measures for insuring personal and household cleanliness; for the early removal of all refuse matters; for the suppression of nuisances; and for a sufficient supply of wholesome food and pure water. Armies attacked by cholera in low situations should be encamped on high ground, and draw their supply of water from pure springs or rivulets.

REMEDIES.—Venæsection (a remedy often followed by remarkable relief to all the symptoms, and a speedy cure). Castor-oil, in the dose of a table-spoonful repeated at short intervals, so as "to produce vomiting and purging sufficient to insure, from time to time, the evacuation of the stomach and intestines, and to prevent the accumulation of morbid secretions," as practised by Dr. George Johnson. This mode of treatment, though not recommended by such numerical returns as have been hitherto published, seems to have had a good measure of success when carried out in its simplicity under the careful control of Dr. Johnson. Emetics; warm and hot-air baths; exhausted air-bath; frictions with every form of stimulating liniment; internal stimulants, as in the last stage of fever. Saline medicines (Sodæ carb. ʒss, Sodii chloridi ℈i., Potassæ chloratis, gr. vii.); injections of warm water and of warm saline solutions (Sodii chloridii ʒss, Sodæ carb. ℈iv., Aquæ callidæ Ox.) into the veins (a mode of treatment followed by the most prompt and marked relief to all the symptoms, but not to be commended as curing cholera); transfusion of blood; inhalation of oxygen gas; calomel, in scruple or half-drachm doses every hour; cajeput-oil; galvanism; nitric acid applied to the nucha; actual cautery along the spine; large doses of opiates; strychnine; acetate of lead in combination with opium: copious draughts of cold water. A drachm of laudanum and a scruple of calomel administered at the first seizure, and repeated at a short interval, if necessary; chloroform; chloroform and brandy; quinine in large doses; Indian hemp; terchloride of carbon; emetics of tartarized antimony or of tartarized antimony and ipecacuanha; liq. pot. arsenitis; nitrous acid; the wet sheet; extreme cold; prussic acid and carbonate of soda; phosphorus; lemon-juice.

DISEASES OF THE LIVER, SPLEEN, AND PANCREAS.

DISEASES OF THE LIVER.

ICTERUS	Jaundice.
HEPATITIS	Inflammation of the Liver.
ABSCESS OF THE LIVER.	
BILIARY CONCRETIONS.	

ICTERUS—JAUNDICE.

SYNONYMS.—Morbus arquatus; aurigo; morbus regius.

SYMPTOMS.—Languor; inactivity; nausea, loss of appetite, and bitter taste in the mouth; and sense of uneasiness or pain in the right hypochondrium. The tunica conjunctiva of the eye and the whole surface of the body are of a yellow colour; the urine is high-coloured, and tinges linen yellow; the stools are of a clay colour, but in some cases, like the urine, high-coloured; the bowels are usually costive, but the patient is sometimes troubled with diarrhœa; in rare instances, the sweat and saliva are yellow, and all objects seen by the patient are tinged of the same colour. The pulse is generally slow, yet sometimes, especially when the pain is acute, becomes quick and hard, and there is a feverish heat and dryness of the skin. In some cases, also, the skin is the seat of a troublesome sensation of heat and pricking. Should the disease be long protracted, petechiæ and maculæ sometimes appear in different parts of the body; the skin, before yellow, turns brown or livid; even passive hæmorrhages and ulcerations have broken out, and the disease has in some instances assumed the form of scurvy.

CAUSES.—Biliary calculi in the gall-bladder, or its duct; inspissated bile; spasmodic contraction of the ducts themselves; violent passions of the mind; pressure upon the ductus communis choledochus, either by collections of hardened fæces, or by tumours of neighbouring viscera, as of the pancreas, of the mesenteric glands, of the pylorus, of the duodenum, &c.; diseases of the liver itself, as inflammation, partial scirrhus, &c.; the active operation of some poisons and purgatives; morbid redundance of bile; hot climates; pregnancy.

DIAGNOSIS.—The characteristic symptoms which distinguish this from every other disease are, the yellow colour of the skin, and of the tunica conjunctiva of the eye; the deep-yellow colour of the urine; and, in most cases, the white or clay-coloured fæces.

PROGNOSIS.—*Favourable.* The disease having arisen from a cause that admits of easy removal; such as spasm, violent mental emotion, accumulated fæces, or temporary pressure during pregnancy; the strength and appetite little impaired; the disease appearing suddenly; cessation of local pain, followed by bilious diarrhœa. The disease, even in mild cases, runs a chronic course, the skin rarely recovering its *proper colour* under two or three weeks. Unfavourable.—Structural

disease of the liver itself, or of the neighbouring viscera; complication with phthisis; the previous irregular life of the patient; long-continued local pain and tumour; symptoms of hectic; colliquative diarrhœa; symptoms showing a determination to the head, as vertigo, flushed countenance, headache; supervening anasarca; a very dark colour of the skin.

TREATMENT.—Jaundice from inflammation of the liver, or from obstruction of the duct, requires the treatment of hepatitis or of biliary concretions. (See those diseases.) When, however, there is no pain in the right hypochondrium, no fever, and the paroxsyms of acute pain due to the passage of gall-stones are absent, the treatment will consist in the use of emetics, and of gentle aperients to keep the bowels free. In the more strongly-marked cases of jaundice, we may begin the treatment by administering an emetic (Pulv. ipecac. ℈i., Ant. pot. tart. gr. i.); and when that has ceased to operate, a scruple of calomel, followed within two or three hours by an ounce of castor-oil. In cases of less severity, the treatment having been commenced by an emetic, the bowels may be kept free by some saline aperient. (℞. Magnes. sulph. ʒi. Magnes. carb. gr. x. Ant. pot. tart. gr. ½ Aquæ menthæ pip. Aquæ, ãã ʒss.) This medicine may be given during the whole of the illness, so as to keep the bowels open two or three times a-day.

REMEDIES.—Small doses of mercurial preparations, as a grain of hyd. cretâ or blue pill, or half a grain of calomel, in combination with small doses of opium, three or four times a-day; nitro-muriatic acid; nitro-muriatic acid bath: Bath and Cheltenham waters.

HEPATITIS—INFLAMMATION OF THE LIVER.

SPECIES.—1. Hepatitis acuta. 2. Hepatitis chronica.

1. ACUTE HEPATITIS.

SYMPTOMS.—Pain in the right hypochondrium, increased by pressure, by deep inspiration, by coughing, or by lying on the left side; dry cough; difficulty of breathing; shooting pains in the chest, resembling pleurisy; sympathetic pain in the right shoulder; yellow tinge of the tunica conjunctiva, and sometimes actual jaundice; high-coloured urine; vomiting; hiccup; costiveness or diarrhœa. There is also more or less pyrexia. In some cases, the fæces are of a clay colour, owing to a deficiency of bile; in others, the bile is in excess, and is rejected by vomiting and stool.

When the concave surface of the liver is affected, the pain is more obscure, and is referred to the back; the breathing is less anxious; but the functions of the stomach are more disturbed. The same disturbance takes place when the left lobe of the liver adjacent to the

stomach is inflamed, and when the posterior and inferior portion of the organ is implicated, there is more or less pain or disturbance in the function of the kidney.

TERMINATIONS.—In resolution; in chronic disease; in diffused or circumscribed abscess; in gangrene.

CAUSES.—All the common causes of inflammation; biliary concretions; the violent operation of emetics; external injury; intense heat; hot climates; intemperance.

DIAGNOSIS.—From *pneumonia*, by the pain in the shoulder; and by the local pain, increased by pressure; by the yellowness of the skin and conjunctiva; by the colour of the urine and fæces; and in many cases by the absence of cough and expectoration.

From *gastritis* and *dyspepsia*, by the seat of the tenderness upon pressure, and by the colour of the eye and skin, of the urine and fæces.

PROGNOSIS.—*Favourable.* About the third, fifth, or seventh day, bilious diarrhœa; universal and free perspiration; copious sediment in the urine; inflammation appearing upon an external part; hæmorrhage from the hæmorrhoidal veins; an abatement of fever.

Unfavourable.—Intensity of pain and fever; the pain confined to a point; continual hiccup; cold extremities; obstinate constipation. Rigors and hectic fever, as indicating the formation of abscess.

TREATMENT.—*Indications.* Those of other acute inflammations.

They are best fulfilled by,—

1. General bloodletting. This remedy should be used in moderation, and only in the early stage of the disease.
2. Local depletion by cupping or leeches; or, when the hæmorrhoidal or catamenial evacuations are suppressed, the abstraction of blood from the anus.
3. When the more acute symptoms have been subdued, blisters over the seat of the pain.
4. Brisk saline aperients.
5. Saline and antimonial diaphoretics.
6. Mercurial inunction, with a view of affecting the mouth, especially during the inflammatory stage of the disease.
7. A low diet, consisting chiefly of farinaceous food.

2. CHRONIC HEPATITIS.

SYMPTOMS.—A sense of weight and obtuse pain in the region of the liver, increased by deep pressure or by lying on the left side, with an enlargement and preternatural hardness of the organ, obvious to the touch. Pain referred to the right shoulder. There is a sense of fulness and distension of the stomach, with flatulence, and loss of appetite. The countenance is sallow; the patient is torpid, inactive, and despond-ing; the bowels are obstinately costive; the stools clay-coloured; and

there are repeated attacks of jaundice, followed, at length, by ascites, and œdema or anasarca of the lower extremities.

CAUSES.—The acute form; chronic dyspepsia; phthisis pulmonalis; hot climates; excess in eating or drinking; intemperance; hypertrophy of the heart; structural diseases of the liver, such as carcinoma, tubercles, melanosis, hydatids, fatty degeneration, and effusions of blood (hepatic apoplexy).

DIAGNOSIS.—From *empyema* and *pneumothorax* by the non-protrusion of the intercostal spaces, and, in many instances, by being able to trace the tumour from the margin of the ribs. Sometimes the nature of the permanent disease which has caused the chronic inflammation of the liver may be ascertained by external examination. The nodulated enlargement, known as the "hobnail liver," or *cirrhose*, may be perceived through the parietes; so also with the swollen projection of cancer, the single large round projection caused by a collection of hydatids, and the single smooth round tumour near the margin of the liver, caused by a distended gall-bladder.

PROGNOSIS.—When the disease is attended by well-marked enlargement of the liver, probable remote termination in ascites and anasarca. In the absence of distinct enlargement of the organ, the prognosis is favourable; but the disease does not admit of prompt cure.

TREATMENT.—*Indications.* I. To subdue existing inflammation. II. To relieve the circulation through the vena portæ. III. To improve the general health.

I. The first indication is fulfilled by the occasional application of leeches to the region of the liver as often as it is tender to the touch; by blisters; and by mercurial preparations in small doses, often repeated, with mercurial inunction, so as slightly to affect the gums.

II. The second indication is fulfilled by saline aperients, given every morning, so as to keep the bowels loose. When the intestinal canal is healthy, drastic purgatives are often more effective than any other remedies. If the digestive powers are much impaired, a course of bitter tonics, such as the infusions of gentian, quassia, or calumba, with soda, or some preparation of steel, if the patient is anæmic.

III. This indication is best fulfilled by removal from a warm to a cold climate, a sea voyage, and moderate exercise in the open air.

REMEDIES.—Mercurial preparations; extract of taraxacum; the iodide of potassium, or iodine given internally, and used externally.

The nitric or nitro-muriatic acid is frequently of great use when mercury cannot be employed, or when there is a redundancy of bile. It may be given internally, in doses of ten or twenty drops, with any of the tonic infusions, or it may be used, greatly diluted with water, as a bath.

ABSCESS OF THE LIVER.

SYMPTOMS.—If in a case of hepatitis severe rigors occur, followed by well-marked hectic fever, and the previous continued pain, whether dull or acute, is exchanged for a distinct throbbing, there is reason to believe that suppuration has taken place. Rigidity of the parietes of the abdomen, especially on the right side, and in the right rectus muscle, is also of common occurrence in abscess of the liver.

Abscess of the liver may burst into the stomach, and be emptied by vomiting; into the colon or duodenum, and be evacuated by the bowels; through the diaphragm into the cavity of the chest, constituting empyema; into the lung or bronchial tube, and be expectorated; or, it may open externally, between the ribs, or below them, through the muscles of the back. In very rare cases, the abscess discharges itself into the pericardium, into the pelvis of the kidney, into the ascending vena cava, or into the cavity of the abdomen, where it sets up fatal peritonitis.

CAUSES.—*Predisposing.* Those of the inflammation of the liver which precedes it. *Exciting.*—Phlebitis (leading to purulent deposits in the liver and lungs). Dysentery. Operations on the rectum, bladder, or vagina. Ulceration of the stomach and intestines.

COMPLICATIONS.—Ascites. Inflammation, more or less extensive, of the organs upon which the abscess presses, and through which it ultimately discharges itself.

DIAGNOSIS.—The nature of the disease will be inferred from the colour of the discharged matter, and from the rigors, throbbing pain, and hectic fever attending the process of suppuration.

PROGNOSIS.—This will depend, in great measure, on the direction in which the abscess discharges itself, and on the degree of inflammation and fever which accompany its progress. The prognosis is most favourable when the opening is in the parietes of the chest or abdomen. The prognosis is less favourable before than after the discharge of the abscess, as the process of suppuration gives rise to severe constitutional irritation. It is in the highest degree unfavourable when the abscess discharges itself into the peritoneal cavity.

TREATMENT.—Should the abscess point externally, it must be brought forward as quickly as possible by poultices and fomentations, and the matter must be discharged by an early incision. At the same time, a generous diet, with stimulants or tonics, according to the degree of debility, must be prescribed.

BILIARY CONCRETIONS—GALL-STONES.

SYMPTOMS.—Biliary calculi give rise to no pain or inconvenience, *unless they occasion* some impediment in the gall-ducts. The passing

of the gall-stone is accompanied by the following symptoms:—Excruciating pain in the epigastrium, extending to the right hypochondrium and back, occurring in severe paroxysms, with intervals of comparative ease, during which there is a dull heavy pain in the epigastrium, generally relieved by firm pressure. Nausea, frequent vomiting of a clear sour fluid, and constant hiccup, are also often present, and jaundice commonly supervenes in the course of the attack. The urine is generally high-coloured, and the motions pale. The general symptoms are an infrequent full pulse, or a frequent and feeble pulse, with profuse perspiration; or, if there is inflammation present, the symptoms of fever. The passage of the calculus from the gall-ducts into the intestine is attended by a sudden cessation of the pain.

TERMINATIONS.—In inflammation, followed by suppuration, the discharge of the calculus externally, or through some internal organ, as in ordinary abscesses of the liver. After the escape of the gall-stones into the intestines, constipation or obstinate obstruction of the bowels, either immediate, when the stones are large, or remote, when they have become the centres of further intestinal concretions. Sometimes large quantities of calculi are found in the gall-bladder and gall-ducts after death, though no sign of their presence existed during life.

DIAGNOSIS.—The pathognomonic sign is the excruciating pain relieved by pressure. When the gall-stones are numerous, their presence may sometimes be detected by a rough crepitation under the finger. By watching the evacuations, and diluting them with water, the gall-stones may be sometimes collected floating on the surface. If the gall-stone is round and smooth, there is a presumption in favour of its being the only one; but if it presents a flattened surface, it is to be presumed that there are several. The calculi may be as small as a small seed or larger than a walnut. They have been found in the intestines of great size, and moulded so as to fill the canal, and to give rise to serious obstruction. They are commonly of a dark-yellow brown colour, of soft consistence, and have several flattened surfaces. They consist of cholesterine and the colouring matter of the bile, sometimes blended with carbonate or phosphate of lime.

TREATMENT.—*Indications.* I. To relieve the severity of the spasm. II. To reduce existing inflammation.

I. The first indication is fulfilled by opium, the warm bath, warm fomentations, emetics, and bloodletting. The *opium* may be given in doses of a grain, or twenty drops of laudanum, every hour, and in a clyster every six hours (forty minims to one drachm in four ounces of starch or gruel). The *warm bath* should be of the temperature of 100° to 110°, and should be continued till faintness comes on. *Warm fomentations* are generally employed; but it has been recommended to apply pounded ice to the epigastrium. Emetics have been extolled by some, and blamed by others. They are admissible in the absence of inflammation, but not when inflammatory symptoms exist.

II. The second indication is answered by *bleeding*, which is useful chiefly as an antiphlogistic measure; but as it produces debility, it also tends to relax existing spasm. It should always be employed in plethoric persons, or in those prone to suffer from inflammatory diseases. It may be followed up, in the absence of vomiting, by nauseating doses of tartar-emetic.

OTHER ORGANIC DISEASES OF THE LIVER.

The liver is subject to several organic diseases besides those already described—to hypertrophy, atrophy, induration, and softening; to fatty degeneration, cirrhosis, tubercular deposits, serous cysts, and hydatids, and to all the forms of malignant degeneration.

Fatty degeneration of the liver is of very common occurrence in phthisis pulmonalis, and is commonly met with, in conjunction with fatty degeneration of the kidney and other internal organs, in drunkards. It is generally, but not always, accompanied by a great increase in size, and when once developed does not admit of cure.

Cirrhosis, or hobnail liver, is also a common disease, but less frequently present in persons given to habits of intemperance. It is usually marked by the peculiar granular state of the surface, the diminished bulk of the organ, and the coexistence of ascites. But the surface of the liver may present highly characteristic appearances of the disease, without any diminution in the size of the organ, and even with a marked increase of bulk and weight.

Serous cysts and hydatids of the liver are also of common occurrence. They sometimes remain torpid for long periods; but sooner or later they excite inflammation in the surrounding structure of the organ, and give rise to abscess.

Malignant degenerations are very apt to occur in the liver. They assume the several forms of scirrhus, medullary sarcoma, and melanosis; and like malignant degenerations of other important viscera are necessarily fatal. They generally occasion a great increase in the size of the organ, and are accompanied by obstinate jaundice and chronic ascites.

The treatment of all these organic diseases of the liver is palliative, and varies with the symptoms, and the existing state of the system.

DISEASES OF THE SPLEEN.

The spleen may be the seat of inflammation, acute and chronic, as well as of simple enlargement, the result of congestion. But as the symptoms of splenitis are admitted to be very obscure, it will suffice to treat the diseases of the spleen under the single head of

ENLARGEMENT OF THE SPLEEN.

SYMPTOMS.—These are due for the most part to interference with the functions of the parts submitted to pressure. They are, dull pain

in the left side; dyspnœa; dry cough; inability to lie on the right side; depression of spirits; dyspeptic symptoms; and in extreme cases, dropsical effusions.

COMPLICATIONS.—Disease of the liver, an unusual tendency to hæmorrhage, dysentery, and scurvy, and to the anæmic or cachectic state, known as *leucocythemia* (see p. 287).

CAUSES.—Previous attacks of ague; morbid degeneration, especially the deposit of tubercles; morbid softening.

DIAGNOSIS.—By the situation of the tumour in the left hypochondrium, extending, in extreme cases, to the epigastrium, the umbilicus, and the hypogastrium; by the tumour being solid and smooth, generally of an oblong shape, lying beneath the integuments, and moveable. The previous occurrence of ague always affords a probability in favour of the tumour being situated in the spleen.

TREATMENT.—The use of the iodine ointment, or iodine paint, externally, and the hydriodate of potash, with tonics, internally; leeches to the seat of the disease, if there is much abdominal tenderness; friction, in the absence of pain; gentle aperients and alteratives, and moderation in diet. If the disease has been preceded by ague, bark or quinine is the proper tonic.

REMEDIES.—Bromide of potassium. Mercury is contraindicated.

DISEASES OF THE PANCREAS.

SYMPTOMS.—The symptoms of disease of the pancreas are still more obscure than those of disease of the spleen. The enlargement which accompanies it is not readily distinguished from that of the adjoining viscera; and it is obviously very liable to be confounded with organic disease of the pylorus or duodenum. The symptoms generally present are a deep-seated obtuse pain in the epigastrium; nausea, sickness, and emaciation. To these may be added, as of occasional occurrence, constipation or diarrhœa, salivation, and jaundice.

DIAGNOSIS.—Fatty stools afford a strong probability of disease of the pancreas; but cases of pancreatic disease without fatty stools have been reported.

TREATMENT.—The treatment of supposed disease of the pancreas must be so shaped as to meet the urgent symptoms that happen to be present, and with due regard to the existing state of system. Fat and oily substances should, perhaps, be omitted from the diet.

DISEASES OF THE PERITONEUM.

PERITONITIS . .	Inflammation of the Peritoneum.
ASCITES . . .	Dropsy of the Belly.

PERITONITIS—INFLAMMATION OF THE PERITONEUM.

SYMPTOMS.—After rigors, but, in some cases, without any preliminary symptoms, pain commencing in any part of the abdomen, and soon extending over the entire cavity, increased by pressure, and often so acute that even the weight of the bed-clothes is intolerable. The skin of the abdomen is hot; the pulse is in general small, hard, and contracted, though sometimes full and soft; the countenance is expressive of great suffering; the patient lies on his back with the thighs drawn upwards, and flexed on the abdomen; the bowels are constipated; the urine scanty and high-coloured; the tongue is white and covered with mucus, and soon becomes dry and brown, its edges and tip being red; the respiration is difficult, particularly during inspiration, and is chiefly performed by the ribs, as the diaphragm and abdominal muscles cannot act without increasing the pain. Nausea and vomiting are frequently present, and strangury sometimes. When the disease advances without control, it often terminates fatally within twenty-four or forty-eight hours, and death is preceded by typhoid symptoms, great prostration of the vital powers, sudden cessation of pain, sharpened countenance, distension of the abdomen by liquid or gas, vomiting of a coffee-coloured fluid, cold extremities, and coma.

MORBID APPEARANCES.—Injection of the vessels of the peritoneum; coagulable lymph spread over the surface, or flakes of lymph floating in serum or pus; false membranes binding the folds of the omentum, or the several viscera, together.

CAUSES.—Exposure to cold and fatigue; constipation; contusions, wounds, surgical operations; parturition; rupture of any of the abdominal viscera.

PROGNOSIS.—*Favourable*, in peritonitis from common and transient causes. *Unfavourable*, in that produced by mechanical injury, organic disease, parturition, or rupture of the abdominal viscera.

DIAGNOSIS.—From *rheumatism* or *neuralgic pains* of the abdominal muscles, by the pain being increased by pressure, and by the presence of *severe* constitutional symptoms. From hysterical tenderness and pain, by the absence of spinal irritation, and by the more severe constitutional symptoms. The disease, in its early stage, may be distinguished by a feeling of crepitation under the hand, and a *to-and-fro* sound on applying the stethoscope while the abdominal parietes are in motion, as in the act of inspiration.

TREATMENT.—In recent and acute cases bleeding from the arm, *followed by* leeches and warm fomentations, and the internal use of

tartar-emetic combined with calomel and opium in full doses, and at short intervals, so as speedily to affect the system. In very severe cases, mercurial inunction may be employed at the same time. If the stomach is irritable, the tartar-emetic must be omitted. In less severe cases, leeches to the abdomen, followed by warm fomentations, and calomel and opium internally.

In chronic cases, leeches in smaller numbers, calomel and opium internally, and stimulant embrocations to the abdomen, of which the best is hot turpentine. If great debility be present, a stimulant treatment must be resorted to, with an allowance of wine.

After repeated doses of calomel and opium, castor-oil may be given in a half-ounce or ounce dose, and the large intestines may be relieved by enemata of warm water or warm gruel.

If there is painful tympanites or meteorism, turpentine enemata are required, or the long elastic tube may be introduced so as to allow the accumulated gas to escape.

When effusion has taken place, and the febrile symptoms have abated, the case must be treated as one of ascites.

ASCITES—DROPSY OF THE BELLY.

SYMPTOMS.—A progressive and uniform enlargement of the abdomen, accompanied, when the quantity of fluid is large, by tension of the parietes; dulness on percussion over the whole abdomen, when the fluid is abundant; and when the quantity of fluid is small, over the part to which the position of the patient may cause it to subside, the rest of the abdomen being tympanitic; and a sense of fluctuation becoming more and more distinct as the quantity of fluid increases.

The general symptoms which accompany ascites are due to the pressure exercised by the accumulated fluid, and in those cases in which ascites is merely a symptom of some other diseases, to the disease in question. The symptoms arising from the pressure of the fluid are the following:—difficulty of breathing; suffusion of the countenance, and injection of the eyes; and distension of the superficial veins of the abdomen. Thirst, a dry skin, scanty urine, and torpid bowels, are among the most common accompaniments of ascites.

The disease seldom continues long without inducing, or being accompanied by, an anasarcous state of the lower extremities.

CAUSES.—In addition to the general causes of dropsy (see Anasarca), certain diseases of the viscera of the chest and belly, leading to obstructed circulation; diseases of the liver (especially *cirrhose*, or the hobnail liver), diseases of the spleen, pancreas, or mesenteric glands; diseases of the heart or lungs; organic disease of the kidney; scarlatina; loss of tone in the peritoneum after pregnancy; chronic or subacute inflammation of the peritoneum; local injury.

DIAGNOSIS.—From encysted dropsy, by the uniform enlargement and greater width of the abdomen, and, in recent cases, by the more

distinct fluctuation; also, by the greater constitutional disturbance. From *tympanites*, by the dulness on percussion over the seat of the fluid, or over the greater part of the abdomen. From *the enlargement of pregnancy*, by the fluctuation being perceptible in the umbilical region, and the absence of the characteristic signs of the pregnant state. From *retention of urine*, by the coexistence in that disease of constant dribbling of water.

PROGNOSIS.—*Favourable.* The ascertained absence of organic disease of the viscera of the chest and abdomen. The urine healthy, in quality and quantity, and not coagulating by heat; moist skin; the swelling of the abdomen diminishing; the respiration becoming free; the strength little impaired. *Unfavourable.*—Organic disease of the viscera of the chest or abdomen, especially of the liver; great emaciation; sympathetic fever; coma; an impaired constitution; previous bad habits of life, especially intemperance.

TREATMENT.—If pain and tenderness on pressure exist, leeches to the abdomen, followed by mercury so as to affect the mouth. If both are absent, the treatment must vary with the disease, of which the ascites is the effect. If disease of the liver, heart, lungs, or kidney be present, the remedies appropriate to that disease. The remedies for the dropsy itself, irrespective of the causes which may have produced it, are bloodletting, diuretics, and drastic purgatives, unless contra-indicated by existing symptoms. The class of diuretics to be preferred must depend partly upon the cause of the dropsy, and partly on the existing state of the patient.

After a fair trial has been given to these remedies, if the pressure and tension of the abdomen become insupportable, recourse must be had to tapping.

Ascites is often combined with anasarca.

OVARIAN DROPSY—ENCYSTED DROPSY.

SYMPTOMS.—The *encysted dropsy* is seldom preceded, or in the first instance accompanied, by any cachectic state of the system; it is distinctly observed to begin in or near the iliac fossa on one side of the abdomen, whence it gradually diffuses itself throughout the whole cavity; the strength of the patient is long unimpaired, and the appetite and respiration continue good; until the bulk and pressure of the fluid bring on dyspnœa, and anasarca of the lower extremities.

CAUSES.—*Predisposing.* Age from puberty to the termination of the period of child-bearing. *Exciting.*—Obscure.

DIAGNOSIS.—By the commencement on one side; and, except when the disease is of long standing, and the accumulation of fluid considerable, by the unequal enlargement of the abdomen. In the early stages, *fluctuation is not* perceptible, or it is much less marked than in ascites.

PROGNOSIS.—Unfavourable as to ultimate recovery, but the disease may continue for years without proving fatal; sometimes it runs a rapid course.

TREATMENT.—Pain or tenderness over the seat of the tumour must be met by leeches and antiphlogistic measures, and mercury to affect the gums. But remedies are ineffectual; and the only chances of recovery are in a spontaneous cure by rupture of the cysts, and the discharge of the contained fluid by the intestines, bladder, vagina, or parietes of the abdomen; or in an operation. This may consist in simple puncture of the tumour, as in common ascites; or in puncture of the tumour, the discharge of the fluid, and the extraction of the sac.

ANASARCA—DROPSY OF THE FLESH.

SYMPTOMS.—The disease generally commences in the lower extremities, and first shows itself towards evening with a swelling of the feet and ankles, which disappears on assuming the recumbent posture. By degrees the swelling becomes permanent, ascends, and successively occupies the thighs, the integuments of the trunk of the body, the penis and scrotum, and in females the labia. In extreme cases the dropsical effusion extends to the upper extremities, and to the integuments of the face, neck, and chest, and it is often accompanied by ascites and hydrothorax. The parts occupied by the fluid *pit* on pressure with the finger. The urine is generally small in quantity, high-coloured, and deposits a reddish sediment; sometimes, however, it is of a pale whey colour, and more copious. The skin is generally pale and dry, and, when the effusion is in large quantity, it becomes tense and shining, and the water often oozes through the pores of the cuticle, or raises it in the form of small blisters, or a portion of the skin sloughs. The other symptoms vary with the cause of the dropsy, and the diseases with which it may happen to be combined. The symptoms most commonly present are dyspnœa, palpitation, flatulence, and drowsiness.

CAUSES.—*Predisposing.* All causes of debility. *Exciting.*—Certain organic diseases, producing an obstruction to the free circulation of the blood, especially diseases of the heart, lungs, and kidneys (of diseases of the heart, dilatation of the right side; of diseases of the lungs, emphysema; of diseases of the kidney, acute desquamative nephritis, and fatty degeneration, are the most common causes of dropsy); suppression of customary evacuations; the sudden disappearance of cutaneous eruptions; abuse of spirituous liquors; common catarrh; the exanthemata, especially scarlatina; pressure on the veins of the extremities.

DIAGNOSIS.—From emphysema, by the swelling in anasarca pitting on pressure; in emphysema, being elastic, and crepitant.

PROGNOSIS.—*Favourable.* The disease having been induced by causes which admit of easy removal, such as common cold; the strength little diminished; the constitution of the patient previously unimpaired; the appetite remaining entire. *Unfavourable.*—Concomitant organic disease; great debility and emaciation.

TREATMENT.—The treatment of anasarca must vary with the cause. If it depend upon visceral disease, the treatment will be appropriate to that disease; if upon pressure, the compressing cause must be removed; if upon an inflammatory state of system, bleeding and other antiphlogistic remedies will be required. Diuretics may be employed where the kidneys are sound, but are contraindicated in renal dropsy, and especially in that form of renal dropsy which follows scarlatina. In such cases, drastic purgatives and diaphoretics are to be preferred.

If, in spite of remedies, the anasarca increases, and the legs are so swollen as to require immediate relief, the fluid must be let out by repeatedly introducing a common curved needle under the skin, taking care not to make the punctures too near together. In cases of great debility, and when the discharge of fluid takes place very rapidly, it may be expedient to keep up a uniform pressure by bandages.

Anasarca following attacks of scarlatina, is often associated with œdema of the face and eyelids, and generally shows itself after attacks of less than average severity. It is of the inflammatory kind, depends upon congestion or inflammation of the kidneys, and is best treated by cupping to the loins, warm baths and sudorifics to act upon the skin, and by the less violent drastic purgatives.

CHAPTER V.

DISEASES OF THE URINARY ORGANS.

1. Diseases of the Kidney.
2. Diseases of the Bladder.

DISEASES OF THE KIDNEY.

NEPHRITIS	Inflammation of the Kidney.
GRANULAR DISEASE OF THE KIDNEY.	
GRAVEL.	
URINARY CALCULUS.	
HÆMATURIA	Bloody Urine.
ISCHURIA RENALIS . . .	Suppression of Urine.
DIABETES	Immoderate flow of Urine.

NEPHRITIS—INFLAMMATION OF THE KIDNEY.

SYNONYM.—Desquamative nephritis (acute and chronic), named from the fibrinous, bloody, or purulent casts of the urinary tubes discharged, blended with epithelium scales, in all cases of nephritis.

SYMPTOMS.—Pain in the back, generally on one side, extending along the course of the ureter to the neck of the bladder, to the groin or scrotum, frequently attended by retraction of the testicle and numbness of the inside of the thigh. The pain is deep-seated, circumscribed, or diffuse, acute or dull, sometimes only felt upon pressure, but always increased by firm pressure, by the erect or sitting posture, by coughing, sneezing, or other strong expiratory movements, and sometimes even by the descent of the diaphragm in ordinary respiration. It is also increased by straightening or stretching the leg of the affected side; the patient accordingly lies on the back, or on the affected side, and draws up one or both legs. The urine is either wholly suppressed or scanty, and voided painfully at short intervals. At first it is usually bloody, and coagulable by heat and acids; but after a time the blood disappears, and the urine becomes pale, watery, not coagulable, and either neutral or alkaline. Albumen is, however, sometimes present; but in those cases the inflammation is probably complicated with granular degeneration of the kidney. There is generally some fever; the pulse is full, hard, and frequent at first, but becomes small as the disease advances; the tongue is covered with a white fur; the

stomach is very irritable, the bowels are confined, and the patient suffers from tympanites, and wandering pains in the abdomen. There is great depression of spirits, and the countenance wears an expression of great anxiety.

TERMINATIONS.—In resolution; in abscess; or in gangrene; known by the symptoms that accompany these terminations of inflammation in other parts. In fatal cases, death is often preceded by coma.

MORBID APPEARANCES.—The inflamed kidney of a scarlet or crimson colour; sometimes enlarged, indurated, or infiltrated with pus. The ureters red, their mucous membrane thickened, and covered with pus; or adherent, so as to obliterate the canal. Enlargement of the ureter above the obstructed or obliterated portion.

MICROSCOPIC APPEARANCES.—Fibrinous casts of the urinary tubes involving blood, or pus globules (see figures 30, 34, and 35, pp. 153 to 155).

CAUSES.—The common causes of inflammation; acrid diuretics; calculi or gravel in the uriniferous tubes, ureters, or bladder; external injury; long-continued and violent exercise of the muscles of the back, as in riding; loaded colon; retrocedent or atonic gout; diseases of the urethra, prostate gland, bladder, and ureters.

DIAGNOSIS.—From *lumbago*, by the pain being confined to one side, following the course of the ureter, not being increased by motion of the muscles, and being accompanied by numbness of the thigh and by retraction of the testicle; also by the accompanying urinary disorder.

Sometimes nephritis is unaccompanied by pain in the kidney, while the stomach, the brain, or the bladder exhibit all the signs of idiopathic disease.

PROGNOSIS.—*Favourable.* Remission of pain fever and tension, followed by a very copious excretion of high-coloured urine, mixed with mucus or pus; universal equable perspiration; hæmaturia, if succeeded by a remission of symptoms. The prognosis is generally favourable in idiopathic nephritis before the fifth day. *Unfavourable.*—Severe rigors, and supervening hectic fever; sudden cessation of pain, hiccup, delirium, and cold extremities.

TREATMENT—*Indications.* I. To reduce the inflammation. II. To relieve the pain.

I. The first indication is fulfilled by, 1. General and local bloodletting; the latter, either by the use of cupping-glasses, or by the application of numerous leeches to the region of the kidney or perinæum.

2. Castor-oil to act upon the bowels, aided, if necessary, by warm emollient clysters. The castor-oil may be given in doses of half an ounce or an ounce, with twenty or thirty drops of laudanum.

3. Mild diaphoretics, especially frequent and copious draughts of mucilaginous and diluent liquids, as barley-water, solution of gum-arabic, decoction of marsh-mallows, or linseed-tea with a little nitre.

II. The second indication is fulfilled by, 1. Clysters of laudanum

h (℥i. to Oss.), or an opium suppository (one or two grains pium).

warm hip-bath, repeated according to the violence of the d fomentations to the region of the kidney.

fect rest should be enjoined. The catheter to be used at tervals, if necessary.

onic cases an issue or seton may be inserted in the loins. In subjects, the tonic bitter infusions are indicated. The alkalies, otass and lime-water, are useful, so long as the urine con- d; and the mineral acids, so long as it is alkaline.

s are contraindicated, because they frequently induce stran- thus increase the inflammation of the kidney.

DIES.—In chronic cases, a decoction of the dried leaves of the us Persica, uva ursi, or pareira brava. The balsam of copaiba. bing to the loins.

treatment of acute nephritis, Dr. Christison recommends carried to syncope, followed by opium in the dose of two or ins, or thirty or forty minims of the tincture. He has seen se "abruptly arrested in this way." (Libr. Pr. Med.)

GRANULAR DISEASE OF THE KIDNEY.

COMPLICATIONS AND TERMINATIONS.—Anasarca and ascites; bronchitis, diarrhœa, dyspepsia, constant vomiting; pleurisy, peritonitis, pericarditis, pneumonia; coma; chronic rheumatism; and organic diseases of the heart and liver.

PROGNOSIS.—Complete recovery is rare; and the disease is very apt to recur. *Favourable.*—The early stage or previous rare occurrence of the disease; absence of complications; gradual disappearance of albumen from the urine, and its increasing specific gravity; moisture of the skin. *Unfavourable.*—The reverse of these; suppression of urine; coma.

ANATOMICAL CHARACTERS.—An increase in the quantity of fat naturally existing in small proportion in the epithelium cells lining the urinary tubules:—In other words, a fatty degeneration, bearing a close analogy with the fatty liver, with which, as well as with fatty deposit in the coats of the arteries, and on the valves of the heart, it is often associated. The various appearances of the diseased kidney are due to the extent, rapidity, and duration of the morbid changes. They are:—

1. Congestion of the kidney with enlargement, and with or without deposition in its internal structure. 2. A granular deposition into its cortical and tubular textures, sometimes finely granular, sometimes roe-like, and attended with atrophy or absorption of the proper renal tissue. 3. Deposition of a homogeneous yellowish-gray matter, with similar atrophy. 4. Disseminated tubercles. 5. Induration. 6. Atrophy, from disappearance of the proper renal structure, with little or no deposition. And, 7. Mere anæmia, or paleness. (Christison.)

MICROSCOPIC CHARACTERS.—In the early stage granular casts, composed of fibrin and disintegrated epithelium (fig. 31, p. 154). In an advanced stage similar casts entangling oil globules (fig. 33, p. 154).

CAUSES.—*Predisposing.* The scrofulous diathesis. It occurs in both sexes, and at all ages; at five, and even under, and so late as seventy-nine. (Christison.) Of seventy-four fatal cases recorded by Dr. Bright, nineteen were under thirty, fifty under fifty, thirteen above fifty, and four above sixty. *Exciting.*—The impure air, and other unwholesome influences to which the poor inhabitants of large towns are exposed; intemperance; mechanical injuries; cold; a previous attack of scarlatina, followed by dropsy.

TREATMENT.—*Indications.* I. To relieve congestion of the kidney. II. To remove the attendant dropsy. III. To improve the general health.

I. In acute cases, when fever is present, bleeding may be necessary: and if there is severe pain in the loins, cupping. In debilitated subjects, dry cupping may be prescribed.

II. This indication is fulfilled by purgatives and diaphoretics, diuretics being inadmissible. In the absence of diarrhœa, drastic purgatives, such as full doses of the compound jalap powder, may be

given every morning, at the same time that Dover's powder, in five or ten-grain doses, is given two or three times a-day, to act upon the skin. When there is much debility, stimulant diaphoretics, such as the liq. ammon. acet. in doses of an ounce, three or four times a-day, are indicated. The warm bath, or the hot-air bath may be administered at intervals of one, two, or three days. The skin should be kept warm.

III. A nourishing and unstimulating diet should be prescribed; and preparations of steel, of which the tinctura ferri muriatis (in doses of ♏xx. or ʒss.) is the best.

In the treatment of complications, the nature of the existing disease of the kidney must be borne in mind, and the remedies appropriate to those complications, modified by the existing disease and state of system, must be prescribed.

REMEDIES.—Mercury? The abstinence from fat and oily substances, and from articles containing starch and sugar?

PROPHYLAXIS.—Temperance, pure air, a clean skin, plain and wholesome diet, and regular exercise in the open air, are particularly to be enforced in persons who have suffered, or seem liable to suffer, an attack of this disease.

GRAVEL.

SYMPTOMS.—Dull or acute pains, with a sense of heat and heaviness in the lumbar region, with more or less pain or difficulty in voiding the urine, increased by sudden and violent motion, with occasional pain behind the pubes, irritation at the neck of the bladder, and itching or pain at the extremity of the penis. Sometimes there is retraction of the testicles, with discharge of bloody urine, or of clots of blood. The urine, even while warm, contains a sandy powder, crystalline grains, or small calculi. It is generally rather scanty, high-coloured, of high specific gravity, acid, of a strong odour, and disposed to become turbid on cooling. The digestive organs are deranged; there is a sense of weight in the epigastrium, acidity of the stomach, flatulence and frequent eructation; constipation; furred tongue; dry skin; restlessness; and feverishness.

The most common form of gravel consists of urate (lithate) of ammonia, with or without free uric acid (*red gravel*). Next in point of frequency, is pure uric acid. The ammoniaco-magnesian phosphate, or a mixture of this with amorphous phosphate of lime (*white gravel*), comes next in order; then the oxalate of lime. These several sorts may be mixed, and the first and second may alternate with each other. For the mode of distinguishing these several varieties, see p. 152.

CAUSES.—*Predisposing.* Constitutional and hereditary peculiarities; the period of infancy, and from the age of forty upwards; high living; sedentary habits; gouty diathesis. *Exciting.*—Cold; blows and in-

juries to the loins; dyspepsia; the use of water containing calcareous matters; acescent fruits. In the case of the oxalate of lime gravel, an excess of saccharine matters, and vegetables and fruits containing oxalic acid; organic disease of the kidney or bladder.

TREATMENT.—This varies with the species of gravel discharged.

In the uric or lithic acid gravel, a diet chiefly vegetable, and in extreme cases strictly so; diluents; the alkaline bicarbonates, of which the bicarbonate of potash is to be preferred, in ten-grain doses, three or four times a-day, so long only as the urine has an acid reaction; or the alkaline aërated waters of Vichy and Carlsbad.

When the phosphates are deposited, a more generous diet is admissible, with a moderate allowance of wine, and the dilute mineral acids (the nitric, muriatic, or nitro-muriatic acid), should be given at short intervals. When the phosphatic diathesis has been brought about by exhaustion of mind or body, opium is indicated, and often proves extremely serviceable.

In the oxalic acid diathesis (for urine containing oxalate of lime is generally bright and clear, and the gravel is only to be detected by the microscope), the alkaline carbonates are indicated. All articles of food containing oxalic acid should be avoided, and saccharine substances should be taken in moderation, or, in extreme cases, disallowed. The patient should use soft water, and should take the mineral acids, especially the muriatic acid, combined with tonics, till the urate of ammonia shows itself in the urine.

In all forms of gravel, strict attention must be paid to the general health; to the functions of the skin, to the avoidance of sudden changes of temperature, and to the state of the digestive organs. Warm bathing is beneficial by promoting the action of the skin. Due attention should also be paid to the state of the bowels. Symptoms supervening on gravel must be treated by the remedies appropriate to such symptoms occurring independently of it. In cases of unusual severity, it may be necessary to resort to leeching or cupping, fomentations, warm baths, mucilaginous drinks, enemata, low diet, and rest.

URINARY CALCULI.

SYMPTOMS.—These vary with the situation of the calculus. Stone in the bladder or urethra comes under the care of the surgeon; but when calculi are contained in the kidney or ureter, they require medical treatment.

The symptoms of *calculus in the kidney* are those of gravel in its most severe form, or of nephritis—viz., pain in the loins, extending to the groin, testicle, or extremity of the penis, retraction of the testicle, painful and frequent micturition, and bloody urine. There are nausea and vomiting, restlessness, and slight fever. These symptoms are *often suddenly* removed by the discharge of a small calculus, often

accompanied or followed by that of a large deposit of gravel. The presence of this calculus in the kidney often leads to severe inflammation, and to those diseases of the kidney which are the result of it.

The symptoms of *Calculus in the Ureter*.—When a calculus is passing along the ureter (a fit of the gravel), there is intense pain, or a dull pain along the affected ureter and spermatic cord on the same side, extending to the penis, the testicle, or the inside of the thighs. There is frequently great tenderness on a circumscribed spot of the abdomen, corresponding with the seat of the calculus. The patient is troubled with constant and often ineffectual calls to pass urine, which is tinged with blood. There are severe nausea and vomiting, with extreme anxiety and intense suffering. These symptoms may pass off suddenly, on the arrival of the calculus in the bladder, followed, in some cases, by its discharge from the urethra. In other instances, the calculus remains impacted in the ureter, leading to disease of the kidney, or giving rise to large accumulations of urine, with distension of the pelvis of the ureter, and even of the walls of the kidney itself. The kidney thus enlarged has grown to such a size as to fill the abdomen, and be mistaken for ascites.

TREATMENT.—To relieve the acute pains, a full dose of opium (two or three grains), or an equivalent dose of laudanum, or of morphia should be given; or, when the stomach is very irritable, an opiate enema (℥i. of laudanum in four ounces of gruel) or a suppository (two or three grains of solid opium). A warm bath, followed by fomentations to the abdomen and loins, should also be prescribed, and if the pain is extremely acute, venæsection and leeches to the loins.

The medical treatment of *calculus in the bladder* will be that of the form of gravel voided by the patient.

HÆMATURIA—BLOODY URINE.

SYMPTOMS.—An evacuation of urine, mixed with blood, preceded, in many cases, when not the effect of injury, by pain and sense of weight in the region of the kidney.

CAUSES.—Inflammation of the kidney; Bright's disease; calculus in the kidney or bladder, or in its passage through the ureter or urethra; diseased prostate; a diseased state of the mucous membrane of the bladder; malignant fungous growths from the mucous membrane; external violence, or great exertion; the general causes of hæmorrhage; excessive venereal indulgence; cantharides or turpentine. Sometimes it occurs in the course of purpura nautica, or purpura hæmorrhagica; and at the close of severe febrile affections, accompanied by typhoid symptoms. A discharge of blood from the urethra is not an uncommon event in young inhabitants of the Mauritius.

DIAGNOSIS.—Bloody urine is of a bright-red or dark-brown colour, and, if the quantity of blood is considerable, lets fall a dark-brown

deposit, or contains distinct coagula. For the chemical and microscopical characters, see Part I., p. 150.

The source from which the blood flows may sometimes be inferred from the accompanying symptoms, and a careful examination of the urine. If the hæmorrhage is preceded by pain in the region of the kidney, if the blood is equally diffused through the urine, and if the urine, when examined by the microscope, is found to contain casts of the urinary tubes (see Part I., p. 153), the blood has come from the kidney. When the first quantity of urine discharged from the bladder is little, if at all, tinged with blood, and the remainder consists of blood or urine highly tinged with blood, there is a strong presumption that the hæmorrhage is from the bladder, especially if symptoms of stone are present. When the blood flows from the urethra without discharge of urine, the urethra is the source of the hæmorrhage.

TREATMENT.—This must be determined by the existing complications, or probable causes of the hæmorrhage. If the disease be the consequence of injury, or the patient be of a full plethoric habit, bleeding, or cupping to the loins, rest, and gentle aperients will be required. If it arise from irritation of the kidney by calculus, together with the remedies proper for that disease, frequent draughts of mucilaginous liquids, as thick barley-water, solution of gum acacia, decoction of marsh-mallows sweetened with honey, opium, and copious emollient clysters should be prescribed. If the blood coagulates in the bladder, and gives rise to difficult micturition, the catheter must be used, and injections of warm water, decoction of marsh-mallows, or of poppies must be resorted to.

When the hæmorrhage is excessive, cold water, or a cold solution of alum (℈i or ℈ii to the pint) must be substituted for warm water; and cold water may also be injected into the rectum. At the same time a decoction of gall-nuts, pomegranates, or logwood; or the uva ursi, kino, or catechu, gallic acid, either pure, or as it exists in Ruspini's styptic (an alcoholic solution of the acid), or the extract of Krameria in scruple doses, may be given by the mouth. Acetate of lead in combination with opium, and the tinctura ferri muriatis have also been recommended.

ISCHURIA RENALIS—SUPPRESSION OF URINE.

SYNONYM.—Anuria.

SYMPTOMS.—Languor, restlessness, a sense of weariness and weight in the loins and lower extremities, frequent pulse, heat of skin, flushed face, headache, nausea, and vomiting. These symptoms are followed about the third day by drowsiness and œdema of the face, or by anasarca of the limbs and entire body. About the fourth day, coma sets in, and death takes place in two or three days more. At the onset of the disease, a small quantity of muddy urine may be

voided: but when the disease is fully formed, there is complete suppression.

In some cases, there is no pain in the loins, and no fever, but there are slight nausea and drowsiness. During the second or third day the patient becomes comatose, and dies in from 24 to 30 hours. In other cases, the kidney continuing to secrete urine, the bladder is empty from some mechanical obstruction in the ureters. In these cases the disease sets in with excruciating pain, which at length subsides; and the patient becomes drowsy and dies comatose.

CAUSES.—Pre-existing disease of the kidney, excited into activity by blows or falls, or exposure to wet and cold. The action of certain poisons, as digitalis, arsenic, corrosive sublimate, and cantharides. Acute inflammation of the kidney. Mechanical obstruction in the ureters.

DIAGNOSIS.—From *retention of urine* by the empty state of the bladder as ascertained by the hand, and by the use of the catheter.

PROGNOSIS.—The disease is fatal, if it does not soon yield to remedies. In persons of advanced age, long subject to urinary disorders, the prognosis is extremely unfavourable.

TREATMENT.—*Indications.* I. To reduce existing inflammation, and so promote the secretion of urine. II. To relieve pain.

I. The first indication is fulfilled by bleeding from the arm, or by cupping from the loins. Depletion may be followed by the warm bath, which has the additional advantage of relaxing the tissues in cases of suppression of urine dependent on mechanical obstruction.

II. The second indication is fulfilled by full doses of opium (two or three grains of solid opium, or ʒss. of laudanum, followed, if necessary, by smaller doses at intervals of three or four hours). Some relief is also obtained by hot fomentations to the seat of the pain.

If the bowels are confined, a full dose of castor-oil should be given, combined with laudanum (Ol. ricini ℥i. Tinct. opii ♏xx or ♏xxx). When the kidneys have been previously diseased, cautious local depletion, with aperients and diaphoretics (Dover's powder in ten-grain doses, or Liq. ammon. acet. ℥ss, with Tinct. opii ♏x or ♏xx), must be preferred to more active measures. When coma has set in, the disease is generally beyond the reach of remedies.

DIABETES—IMMODERATE FLOW OF URINE.

SPECIES.—1. *Diabetes insipidus;* with limpid urine not sweet. 2. *Diabetes mellitus;* with urine of the smell, colour, and taste of honey. 3. *Diabetes chylosus;* with urine containing chyle.

1. DIABETES INSIPIDUS.

SYNONYM.—Chronic diuresis.

SYMPTOMS.—Emaciation, debility, depression of spirits, anxious expression of countenance, thirst, gnawing sensations at the stomach, dyspepsia, white tongue, constipation, dry skin, irritable bladder, greatly-increased secretion of urine.

The urine does not always present the same properties. In some cases, there is merely an increase of water, the other constituents retaining their normal proportion (*Hydruria*); in others, the urea is in defect (*Anazoturia*); and in a third class of cases, in excess (*Azoturia*). In the first and second variety, the urine is of very low density (in one case of the first form 1001.—Christison); in the third variety, the density is high (commonly 1030 to 1035, but sometimes as low as 1020 to 1024).

CAUSES.—Excessive use of liquids, especially of spirituous liquors; hysteria; nervous excitement; granular disease of the kidney; irritation or disease of the bladder or urinary passages. The third variety is not uncommon in young children.

PROGNOSIS.—*Unfavourable*, when combined with disease of the kidneys. In other cases, it frequently yields to judicious treatment.

TREATMENT.—Moderate use of liquids: abstinence from all substances which possess a diuretic property; tonics, especially the mineral acids, with opium; diaphoretics, warm clothing, the warm bath; a nutritive diet. In the second form of the disease, a due proportion of animal food is necessary; but in the third, the diet should consist chiefly of vegetables. Occasional symptoms must be treated by appropriate remedies; excitement of the circulation by moderate bleeding; restlessness, by opium; extreme debility, by tonics or stimulants; irritability of the neck of the bladder, by demulcents.

2. DIABETES MELLITUS.

SYMPTOMS.—The first symptom that attracts attention is frequent micturition. The urine, on being examined, is found excessive in quantity, of a pale straw colour, of a peculiar faint odour resembling hay, of a sweet taste, and containing sugar in greater or less quantity. There is inordinate appetite, generally accompanied by dyspeptic symptoms; excessive thirst; and constipation. The tongue is clammy, and red at the edge, or clean, or white with a brown streak down the middle; the gums are red and tender; the throat dry; the breath has often a sweetish odour, like that of hay; and the skin is dry, harsh, and scaly. The patient is weak and loses flesh. The mind is generally affected, the power of attention being weakened, and the disposition becoming anxious, sad, and irritable. After the disease has continued for some months, or even for several years, the symptoms continuing to increase, the emaciation becomes extreme, and the patient either dies exhausted, or falls a victim to some organic disease. Diabetes is often preceded by cutaneous affections, and accompanied by carbuncles.

RATIONALE.—A form of dyspepsia leading to the formation of sugar in the stomach, its absorption into the blood and elimination by the kidney, accompanied, in most cases, by a rapid waste of the existing structures of the body.

DIAGNOSIS.—From *other forms of diabetes*, by the saccharine quality of the urine. For the mode of detecting sugar in the urine, and of ascertaining its quantity, see Part I., p. 148, and the tables at page 155.

ANATOMICAL CHARACTERS.—The kidneys generally larger than in health, gorged with blood, flabby, with all the vessels and ducts enlarged, and sometimes granular.

COMPLICATIONS AND SECONDARY DISORDERS. — Tubercular phthisis is the most common complication; granular degeneration of the kidney; peritoneal inflammation; anasarca; apoplexy.

PROGNOSIS.—*Favourable.* Short previous duration of the disease, urine not exceeding 12 pints in quantity and 1036 in density; the emaciation not considerable; the appetite and thirst not inordinate; the skin still soft and moist; and the mind not much depressed. When the patient is under treatment, the signs of improvement are, a decrease in the quantity of the urine, without increase of density, steady diminution in the quantity of solids discharged, increase of weight, diminished appetite and thirst, the mind becoming clearer and more cheerful, and the body stronger and more active. *Unfavourable.* —Prolonged duration of the disease, great emaciation, prostration of strength, urine in large quantity and of high density, the solids discharged greatly exceeding the solids contained in the food, intense thirst, inordinate craving for food, the supervention of other diseases, great and sudden prostration of strength.

CAUSES.—*Predisposing.* Hereditary predisposition. *Exciting.*— Cold, drinking cold water when the body is heated; intemperance; distress of mind.

TREATMENT.—*Indications.* I. To improve the digestion. II. To diminish, as much as possible, the sources whence sugar can be supplied to the urine. III. To diminish the secretion of urine. IV. To relieve urgent symptoms.

I. For the fulfilment of this indication, see Dyspepsia.

II. The second indication is fulfilled by a strict regulation of the diet, which should consist principally of animal food, broiled or roasted, with a small quantity of stale and well-fermented bread; and liquids in moderate quantity: of which the best are weak beef or mutton tea, milk, pure spring water, or water holding calcareous salts in solution. Gluten bread may be substituted with advantage for common bread.

III. The third indication is answered by reducing the quantity of liquid, by forbidding the use of tea, of spirituous liquors, of acidulated drinks, and of saline aperients; in fact, of all articles of diet or medi-

cine which have diuretic properties; by increasing the secretion of the skin, by warm baths, Dover's powder, friction, and warm clothing; by opium in repeated moderate doses, as five grains of Dover's powder, three times a-day; and by astringent remedies, such as sulphate of zinc and acetate of lead.

IV. When there is much fever present, bloodletting may be had recourse to; pain in the epigastrium may be relieved by a few leeches; anasarca may be treated by drastic purgatives; affections of the chest by local depletion, counter-irritation, and sedative expectorants; constipation by resinous purgatives; and debility, when extreme, by tonics and stimulants.

In one case which was under my care, a young female continued for months to pass large quantities of saccharine urine without losing flesh or suffering in health. She took no medicine, except a simple tonic infusion, and continued, though not very strictly, a diet containing an excess of animal food. It is evident that no part of the sugar was formed at the expense of the structures of the body. So long as a patient does not lose flesh, it is probably inexpedient to adopt any other treatment. (G.)

REMEDIES.—Small and repeated bleedings; hot-air bath; steel; opium; creasote, as recommended by Dr. Watson.

3. DIABETES CHYLOSUS.

SYMPTOMS.—These sometimes resemble those of diabetes mellitus; at others, they are very slight, and the patient suffers little inconvenience. The urine is generally abundant, of a milky appearance, and varying in density from 1010 to 1020. A short time after its discharge, it sometimes coagulates into a white gelatinous substance, and, after a longer interval, separates into a clear yellowish fluid and a white clot; at other times a white flaky matter is deposited; or a white cream rises to the surface. The substance which gives this character to the urine approaches in its properties those of fibrin or casein. The disease is of rare occurrence, and of slight importance.

CAUSES.—Obscure. Luxurious living, cold, fatigue, mercury, and long residence in hot climates have been mentioned among the causes.

TREATMENT.—Does not admit of removal; but it may be palliated by blood-letting, spare living, diaphoretics, anodynes, and laxatives.

DISEASES OF THE BLADDER.

CYSTITIS	Inflammation of the Bladder.
ENURESIS	Incontinence of Urine.
DYSURIA	Difficulty in voiding the Urine.

CYSTITIS—INFLAMMATION OF THE BLADDER.

SPECIES—1. Acute; 2. Chronic.

1. ACUTE CYSTITIS.

SYMPTOMS.—Pyrexia; acute pain, swelling, and tension in the region of the bladder; pain and soreness, increased upon pressure above the pubes, or in the perinæum; frequent micturition, painful discharge of urine, in small quantities, or complete obstruction to its passage; tenesmus; vomiting.

CAUSES.—Mechanical injury; falls on the abdomen when the bladder is distended; local irritation by calculi; the inflammation of gonorrhœa extended along the urethra; spasmodic or permanent stricture; all the usual causes of inflammation; cantharides; stimulant urethral injections; cold (catarrhus vesicæ).

TREATMENT.—*Indications.* The same as in the other phlegmasiæ.

1. Depletion by the application of leeches to the perinæum.
2. Castor-oil with laudanum, and emollient clysters.
3. The warm bath and fomentations.
4. The exhibition of opium with diaphoretics. (Pulv. ipecac. c. gr. x., or Liq. ammon. acet. ʒss., with Tinct. opii ♏ x. or ♏ xv. every night, followed by castor-oil every morning.)

2. CHRONIC CYSTITIS.

SYMPTOMS.—The discharge of an increased quantity of mucus with the urine, with slight symptoms of irritation in the bladder.

CAUSES.—Diseases of the prostate gland, urethra, ureters, or kidney. Stone in the bladder. Ulceration or fungus of the organ.

PROGNOSIS.—Unfavourable in aged persons and the intemperate, especially when combined with extensive disease of other urinary organs.

TREATMENT.—The treatment consists in the use of remedies which act as stimulants to the mucous membrane, such as the uva ursi, cubebs, copaiba, black pepper, &c. Such remedies, however, are only applicable to simple chronic inflammation, or catarrh of the bladder. The irritable state of the bladder is best met by emollient injections, such as decoction of marsh-mallows with laudanum. The feet should be kept warm, and the patient ought to be protected against cold.

For the symptoms and treatment of spasm of the bladder, irritable bladder, diseased prostate, stricture of the urethra, &c., consult works on Surgery.

ENURESIS—INCONTINENCE OF URINE.

Incontinence of urine may arise from mechanical causes, or from functional derangements of the bladder. The former class of cases falls under the care of the surgeon; the latter may be cured by medicines, and therefore comes within the province of the physician.

CAUSES.—Incontinence of urine, without organic defect, may arise from one of two causes: from violent contraction of the muscular coat of the bladder, the sphincter possessing its usual power, or from debility of the sphincter, the muscular coat of the bladder contracting with its usual force. In the first case, there is generally some source of irritation within the bladder itself, but in rare instances the muscular fibres are thrown into a state of spasm without obvious cause. The first form of disease is most common in males; the second in females and young children.

TREATMENT.—In incontinence of urine arising from spasm of the muscular coat of the bladder, the most effectual remedies are narcotics or sedatives, administered by the mouth, or introduced into the rectum, in the form of suppository or enema. A grain of solid opium as a suppository, or half a drachm of laudanum in a starch injection, will generally succeed in relieving the spasm. In severe cases, the warm bath, cupping to the loins, or counter-irritants, must be resorted to.

In incontinence of urine arising from debility of the sphincter (a form of disease which is common in young children, leading to frequent micturition in the day, and an involuntary discharge of urine at night), two or three drops of tincture of cantharides, with ten drops of tincture of hyoscyamus, increased gradually and cautiously, rarely fail of removing the disease. (I have had several cases of this kind, which have received immediate benefit and a speedy cure from this mode of treatment. In one case, occurring in a young adult, after cantharides had failed, tinctura ferri sesquichloridi in the dose of ʒ ss. three times a-day, effected a speedy cure. G.)

When the urine is perfectly retained during the day, and voided only at night, the disease is rather the effect of habit or sloth, or the result of dreams, than of any debility of the sphincter muscles; and here it may be necessary to resort to other means, such as obliging the child to leave his bed about midnight for the purpose of emptying the bladder, preventing him from drinking liquid in the evening, threatening punishment, or, if all other means fail, keeping up a certain degree of pressure upon the urethra by means of a bougie bound along the under part of the penis.

DYSURIA—DIFFICULTY IN VOIDING THE URINE.

Dysuria may exist in every degree, from slight and momentary arrest of the flow of urine, with or without pain, to complete retention. Some degree of pain generally attends the abortive attempts to discharge the urine, and in severe cases the suffering is intense.

CAUSES.—Long retention of the urine; acrimony of the urine itself; irritation or inflammation of the coats of the bladder, whether originating in the bladder itself, or from causes external to it. Thus, dysuria is one of the symptoms of gonorrhœa, of inflamed prostate gland, of gravel, of urinary calculus, of cystitis and nephritis, of inflamed hæmorrhoids, of inflammation of the rectum, or irritation of it by worms or scybala, of uterine affections, of pregnancy, &c. *Strangury*, an aggravated form of dysuria, is produced by cantharides and other strong irritants. Dysuria is also a symptom of hysteria, and may occur in nervous persons of both sexes. Mechanical impediment to the passage of urine through the urethra, as in stricture, also occasions dysuria.

TREATMENT.—This must depend on the cause. Mechanical obstructions must, for the most part, be removed by mechanical means; existing causes of irritation, whether within the bladder or external to it, must be removed, if possible, by the same means; inflammation, where it exists, must be subdued; and the spasmodic action of the muscles must be relieved by narcotics and sedatives.

Among the causes of dysuria, which are external to the bladder, constipation is the most common; and a brisk purgative, or a proper course of aperients, will soon remove the disease. A suitable purgative in such cases consists of castor-oil ʒ i., Tinct. opii ♏ xx. or ♏ xxx.

Spasm of the muscular coat requires the use of the warm bath with opiate suppositories or enemata. When the spasm is of frequent occurrence, the tincture of the muriate of iron in repeated doses, aided by the cold affusion to the pelvis and thighs, are indicated.

When the urine is scanty and acrid, diuretics and diluents will be required. Dysuria following long retention of urine is best relieved by the warm bath.

CHAPTER VI.

DISEASES OF THE ORGANS OF GENERATION.

AMENORRHŒA . .	Suspended Menstruation.
DYSMENORRHŒA .	Painful Menstruation.
MENORRHAGIA . .	Excessive Menstruation.
LEUCORRHŒA . .	The Whites.
HYSTERALGIA . .	Irritable Uterus.
METRITIS . . .	Inflammation of the Uterus.

SPERMATORRHŒA.

AMENORRHŒA—SUSPENDED MENSTRUATION.

SPECIES.—1. Amenorrhœa with plethora; 2. Amenorrhœa with anæmia or chlorosis.

1. AMENORRHŒA WITH PLETHORA.

The general symptoms and constitutional treatment are those of plethora. (See Plethora, p. 279.) When blood is abstracted, it should be taken away at the approach of the menstrual period.

2. AMENORRHŒA WITH ANÆMIA OR CHLOROSIS.

For a description of the constitutional symptoms and treatment of anæmia and chlorosis, see Simple Chronic Anæmia, p. 282, and Cachectic Chronic Anæmia, or Chlorosis, p. 284. The suspension of the menstrual discharge may be the first of the train of symptoms constituting anæmia and chlorosis; or it may make its appearance after symptoms of debility have already existed for a considerable period.

TREATMENT.—In addition to the general treatment laid down under Anæmia, it is sometimes deemed necessary to prescribe measures for the restoration of the menstrual discharge. The best of these measures is the warm hip-bath at the expected period. The other remedies usually recommended are those known as emmenagogues, of which the chief are savin and ergot of rye. But practically the best emmenagogues are the remedies and modes of treatment which tend to restore the health and strength of the patient.

Amenorrhœa is sometimes accompanied by vicarious or supplemental discharges of blood, or of blood slightly altered from its usual character, from the nose, lungs, stomach, or rectum, and from ulcers of the skin. These discharges, if occurring in important organs of the

economy, may require medical interference, and are best treated by bloodletting and purging, practised a little before the expected period of their occurrence.

The *complications* of amenorrhœa, which are extremely numerous, must be treated by remedies appropriate to those complications, combined with such as restore strength to the system, and tend to re-establish the menstrual discharge.

DYSMENORRHŒA—PAINFUL MENSTRUATION.

SYMPTOMS.—Pain in the loins preceding the menstrual period by a few hours or days; tenderness in the hypogastric region, and sometimes over a considerable extent of the abdomen; soreness or acute darting pains, resembling those of colic, and occurring mostly in paroxysms; vomiting; diarrhœa with tenesmus; dysuria. Nervous and hysterical symptoms are often present. These symptoms increase in severity until the appearance of the menstrual discharge, and then suddenly cease or gradually pass off. The discharge is often, but not always, scanty, and is sometimes accompanied by a tenacious secretion which takes the shape of the internal surface of the uterus.

CAUSES.—*Predisposing.* Plethora; the nervous temperament.

Exciting.—Sudden and violent emotions; increased determination of blood to the uterus; sexual intercourse immediately before the expected flux; constipation; spinal irritation.

PROGNOSIS.—*Favourable.* Most cases admit of cure, or of relief, by the improvement of the general health, and by proper local treatment.

TREATMENT.—*Indications.* I. To relieve urgent symptoms. II. To improve the general health.

I. The first indication is fulfilled, where there is plethora, by the application of leeches to the vulva, or cupping-glasses to the loins; by tepid, hot, or vapour baths; by opium in full doses, or by laudanum and tartarized antimony in small doses, frequently repeated.

II. The second indication is fulfilled by a careful attention to the functions of the stomach and bowels, moderate depletion to meet any irregular determination of blood, and strict attention to the general health.

MENORRHAGIA.—EXCESSIVE MENSTRUATION.

The menstrual flux may be considered as excessive, when it returns with unusual frequency, continues longer than ordinary, or is more abundant than is usual with the same person at other times. It may be the effect of two opposite states of the system:—plethora with inordinate arterial vigour; and general relaxation or debility.

SYMPTOMS.—An immoderate flow of the menses, arising from plethora, is usually preceded by rigors, acute pains in the head and loins, turgid flushed countenance, universal heat, and a strong, hard pulse: when, on the contrary, the symptoms of debility prevail, the pulse is small and feeble, the face pallid, and the respiration short and hurried; there are dull aching pains in the back and loins, and the group of nervous symptoms described under Mimosis Inquieta. (See p. 288.)

CAUSES.—*Predisposing.* Plethora; a laxity of the womb from frequent parturition; difficult and tedious labours, or repeated miscarriages; a sedentary and inactive life; despondency; a poor, low diet; warm liquors, such as tea and coffee, in excess; and heated apartments.

Exciting.—Violent exercise; blows or concussions; violent straining at stool; tight lacing; excess in venery, particularly during menstruation; the application of wet and cold to the feet; organic affections of the uterus. Attacks of menorrhagia are common in women who have changed life some months or years previously.

PROGNOSIS.—*Favourable*, especially when caused by plethora; but when it occurs in persons much reduced by previous disease, or is produced by a laxity of the vessels of the organ, is profuse, long-continued, or of frequent recurrence, it will often resist treatment for a long time. When it arises from organic disease, which is frequently the case after the age of forty-five, it is usually incurable.

TREATMENT.—The treatment of menorrhagia consists in—

1. Reducing the febrile symptoms when urgent by bloodletting; the horizontal posture; rest of body and mind; and a cooling regimen.

2. Keeping the body gently open with laxative medicines, such as the sulphate of magnesia in infusion of roses, with an excess of acid, and the addition of twenty drops of tincture of henbane.

3. When the febrile symptoms are subdued, astringent remedies, of which the muriated tincture of iron is the best, may be given three or four times a-day, with the infusion of quassia. (℞. Tinct. ferri sesquichloridi ♏ xx. or ♏ xxx., Infus. quassiæ ℥ i.)

4. When symptoms of debility are present, tonics or stimulants, such as quinine or wine, must be given with or without the astringent remedies, and in combination with sedatives. See Mimosis Inquieta, p. 288.

In severe cases astringent applications to the vagina and hypogastric region; especially ice, very cold water, or vinegar and water; or injections, consisting of equal parts of the liquor aluminis compositus and water.

LEUCORRHŒA—THE WHITES.

DEFINITION.—An increased secretion of mucus from the vagina. The use of the term is, however, extended to coloured discharges other than those of blood.

SYMPTOMS.—The discharge varies in consistence from a limpid fluid to that of a tenacious ropy mucus, and in quantity from a slight increase of the natural secretion to several ounces in the day. The general health suffers in a marked degree: the appetite is lost or impaired; the bowels are constipated, or irritable; spinal irritation is often present, and there is pleurodyne, palpitation, and the long train of nervous symptoms described under Mimosis Inquieta (p. 288). Pain in the left side is a very common, but by no means peculiar symptom in leucorrhœa.

CAUSES.—*Predisposing.* Debility, chlorosis, luxurious living, warm rooms. *Exciting.*—Over-excitement of the uterine system; obstruction to the circulation; constipation and diarrhœa; a tender state of the spine.

TREATMENT.—*Indications.* I. To improve the general health. II. To arrest the discharge.

I. The general health may be improved by strict attention to diet, and to the state of the bowels, by regular hours, change of air, proper exercise, and cold bathing. The most useful remedy is steel in full doses or chalybeate waters; or a combination of tonics and sedatives, as recommended under Mimosis Inquieta (p. 288).

II. In most cases, an alum or zinc injection is sufficient; in some instances, however, the stronger astringents may be necessary, as catechu, cinchona, oak-bark, tannin, or the rind of the pomegranate; and in others, stimulants, as ammonia, lunar caustic, or lapis infernalis (gr. x. to ʒi. of water—*Ricord*). These substances may be used as a wash, or in the form of injection, or they may be introduced into the vagina by means of a cylindrical pessary of sponge. When much irritability is present, opiate injections may be required; and if there is much congestion, or if there are signs of local inflammation, a few leeches may be applied to the neck of the uterus.

The remedies which act on the mucous membrane through the general system are cubebs, copaiba, cantharides, turpentine, alum, and uva ursi.

HYSTERALGIA—IRRITABLE UTERUS.

SYMPTOMS.—Acute pain in the loins and round the brim of the pelvis, coming on in paroxysms generally a few days before or after the menstrual period, increased by exercise or strong mental emotion, and relieved by the horizontal posture. The neck of the uterus is painful on pressure, and the cervix is found, on examination, puffy and swollen. The general health suffers from the continuance of the pain, and by the confinement it occasions. The symptoms are those of Mimosis Inquieta (p. 288).

CAUSES.—*Predisposing.* The nervous temperament; the period of youth and middle age; previous attacks of dysmenorrhœa. *Exciting.*

—Undue exertion; long standing, when the catamenia are present; uterine irritation from whatever cause; spinal irritation.

DIAGNOSIS.—From *dysmenorrhœa*, by the suffering being constant; from *prolapsus*, by the pain being merely relieved, but not removed, by the recumbent posture; from *metritis*, by the less severity of the local symptoms, and the more stationary nature of the complaint. The coexistence of other nervous affections, of spinal irritation, of hysteric symptoms, and the peculiarly nervous temperament, will materially aid the diagnosis.

PROGNOSIS.—The disease does not endanger life, but often continues unabated for a long period.

TREATMENT.—*Indications.* I. To subdue local pain. II. To improve the general health.

I. The first indication is fulfilled by rest in the horizontal posture; by the belladonna plaster, or opiate embrocation to the spine; by injections into the vagina of acetate of morphia (two to four grains in the ounce of distilled water—*Ferguson*); the warm hip-bath, or the steam-bath; anodynes or sedatives internally, and cautious depletion.

If spinal irritation is present, the tartar-emetic ointment must be rubbed into the back.

II. The general health must be improved by a generous diet, fresh air, and moderate exercise; and, if the patient can bear it, by a course of steel and gentle aperients. All causes of debility, such as depletion, active purgatives, and confinement to close rooms, must be avoided.

METRITIS—INFLAMMATION OF THE UTERUS.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE METRITIS.

SYMPTOMS.—Pain, increased by pressure, in the region of the uterus, and in the cervix on examination per vaginam; pain extending to the loins and thighs; dysuria; a sense of weight and bearing down; swelling of the abdomen and tympanites. These local symptoms are generally accompanied by fever, with nausea and vomiting; and sometimes there are symptoms of hysteria. In the most severe cases, there are slight delirium, dimness of vision, drowsiness, extreme prostration of strength, and subsultus tendinum.

ANATOMICAL CHARACTERS.—The substance of the uterus inflamed and enlarged, œdematous, and softened: in severe cases, pus is infiltrated through its tissue; or an abscess is formed in it. Purulent matter may also be found in the veins and absorbents; especially in puerperal inflammation of the uterus. The morbid appearances in the membranes of the uterus are those of inflammation of the serous and mucous membranes in other parts of the body.

CAUSES.—*Predisposing*. Those of inflammation generally. *Exciting*.—Suppression or diminution of the menstrual discharge from cold; the use of astringent injections; frequent sexual intercourse; physical injuries; blows and falls; childbirth.

TREATMENT.—Depletion, by cupping to the loins, or by leeches to the vulva or groins; or a combination of calomel, opium, and tartar-emetic in full doses; local fomentations; the hip-bath; counter-irritation by mustard poultices or hot turpentine. Dysuria may be relieved by mucilaginous drinks, and the bowels should be kept free by gentle saline aperients, or by castor-oil.

2. CHRONIC METRITIS.

This is a common consequence of the acute form, when neglected or badly treated. It may assume a variety of shapes, and lead to a great number of severe structural lesions of the uterus, such as ulceration, suppuration, membranous inflammation, and enlargement and induration of the mucous follicles and muscular structure of the organ.

SPERMATORRHŒA.

SYMPTOMS. — Involuntary seminal discharges, occurring either during sleep, or in the day-time, in the act of emptying the bowels or relieving the bladder, or soon afterwards, or during long journeys in carriages or on horseback, or after long sitting, and, in extreme cases, on the slightest friction or irritation of the genital organs. The constitutional symptoms are out of proportion to the loss of fluid sustained, and are due in part to the intimate relation subsisting between the sexual function and nervous system. They are those of Mimosis Inquieta (p. 288), combined with those of Hypochondriasis (p. 444). The patient suffers from indigestion, flatulence, and acid eructations, from constipation or teasing diarrhœa. He is restless at night, listless, timid, and desponding during the day. He is subject to flushings of the face, headache, giddiness, noises in the ears, disordered vision, and other symptoms of cerebral congestion. The pupil is usually dilated. He suffers from palpitation and shortness of breath. He is easily startled by noises and readily irritated, and has various nervous feelings, as of cold water trickling down the back, or of ants crawling over the skin; or weakness and numbness of the hands. His memory fails, and his intellect grows weak; he hesitates, and often stammers in his speech. In the most severe cases, the patient's mind is still more seriously affected. His spirits are depressed; he is addicted to silence and solitude; is timid and morose; believes himself the object of plots and persecutions; grows weary of life, and is tempted to commit suicide; and, at length, becomes the confirmed victim of monomania or dementia. Among the occasional symptoms and consequences of this affection, are impotence, rigid contraction of the limbs, paralysis agitans, epilepsy, strabismus, amaurosis, bulimia, and nervous asthma.

CAUSES.—Sexual excesses; masturbation; excessive indulgence in ardent spirits, tobacco, coffee, and tea; horse and carriage exercise, and sedentary habits, in persons strongly predisposed; constipation, dysenteric diarrhœa, ascarides, hæmorrhoids, fissures of the anus, and stricture of the rectum; natural phymosis, stricture of the urethra, varicocele, and inflammation of the urethra, testicles, or prostate; inflammation of the bladder; blisters, and cantharides taken internally; sleeping on the face.

DIAGNOSIS.—From urethral discharges; by these being continuous; from the prostatic secretion by the large quantity (a tea-spoonful, or more) of the discharge in spermatorrhœa. From all other discharges, in one class of cases, by the sensations attendant on them: in other cases, in the absence of such sensations, by the discharge following the emptying of the bladder. Urethral discharges, and morbid secretions from the bladder accompany the first flow of the urine, or are blended equally with the whole discharge from the bladder. The fluid is identified as coming from the vesiculæ seminales by the physical and microscopic characters of the semen (see Fig. 28, p. 152). In one case which came under the notice of the editor, the patient mistook an abundant pale sediment of urate of ammonia (Fig. 17, p. 144), completely dissolved by heat, for semen. The urine alleged to contain semen should always be submitted to examination.

PROGNOSIS.—*Favourable* in those cases in which the discharge is nocturnal, and always preceded and accompanied by the usual sexual phenomena. Less favourable in those cases in which the discharge is diurnal, accompanying the action of the bowels and bladder. Least favourable of all when it is produced by slight causes affecting the state of the genital organs. Most favourable when traceable to mechanical causes in the rectum or urethra, or to skin diseases affecting the neighbouring parts.

TREATMENT.—Though this disease, in a certain proportion of cases, requires surgical treatment, the physician is often consulted respecting it, and becomes the repository of secrets which a patient is very unwilling to reveal more frequently than he is obliged. In some instances the patient requires comfort more than medicine; in others, medical treatment will suffice to effect a cure. As a general rule, the cases in which the emissions are nocturnal, and accompanied by the usual sexual phenomena, admit of cure by abstinence from any bad habits which may have caused them; by the avoidance of such trains of thought as provoke them; by sleeping on a hard bed, with a moderate supply of bedclothes; by securing a position on the side during sleep (by a handkerchief fastened to the wrist and side of the bed); and, in extreme cases, by wearing at night a ring of soft leather a little exceeding the usual size of the penis, and armed with a few sharp points, so that the enlargement of the organ which precedes the discharge may be checked.

The treatment by medicines will consist in all cases of aperients re-

gularly administered, to secure an open state of the bowels (aloetic aperients and hypercatharsis are contra-indicated), and such further remedies as are adapted to the existing state of the system. If nervous symptoms predominate, the treatment prescribed under Mimosis Inquieta (p. 288); if the patient is pale and anæmic, the treatment proper to Anæmia (p. 282); if plethoric, that prescribed in Plethora (p. 279). If on inquiry the patient should be found to suffer from ascarides, the remedies for the removal of the same (see Ascarides), and especially enemata of cold water; if from piles, the medical or surgical treatment recommended for their removal (see Hæmorrhois); if from cutaneous eruptions near the parts of generation, the treatment proper to the particular skin disease. Prostatic disease, stricture of the rectum or urethra, and fissures and painful tumours on the anus, require the interference of the surgeon; and in cases which do not readily yield to simple constitutional treatment, a full-sized catheter may have to be introduced; or caustic may be required to be applied to the membranous portion of the urethra, as recommended by Lallemand.

Remedies.—Galvanic shocks from the loins to the perinæum. Acupuncture. Alternate cold and hot *douche* to the loins, sacrum, and perinæum. Ergot of rye, in doses of from 5 to 20 grains three times a-day. Chalybeate waters. Copaiba. Sedative and narcotic medicines, such as opium, henbane, and camphor. Cantharides, phosphorus, and nitrate of potass (these are condemned by Lallemand).

The careful avoidance by patients suffering from this disease of the whole race of advertising quacks cannot be too strongly insisted upon. (Consult Lallemand on Spermatorrhœa, by M'Dougall.)

CHAPTER VII.

DISEASES OF THE ORGANS OF SENSE.

1. Diseases of the Eye.
2. Diseases of the Ear.

DISEASES OF THE EYE.

1. CONJUNCTIVITIS .	Inflammation of the Conjunctiva.
2. SCLEROTITIS . . .	Inflammation of the Sclerotica.
3. CORNEITIS . . .	Inflammation of the Cornea.
4. IRITIS	Inflammation of the Iris.
5. CHOROIDITIS . . .	Inflammation of the Choroid.
6. RETINITIS . . .	Inflammation of the Retina.
7. AMAUROSIS . . .	Nervous blindness.

INFLAMMATION OF THE CONJUNCTIVA.

SPECIES.—1. Catarrhal Ophthalmia; 2. Purulent Ophthalmia of Infants; 3. Purulent Ophthalmia of Adults; 4. Gonorrhœal Ophthalmia; 5. Strumous Ophthalmia.

1. CATARRHAL OPHTHALMIA.

SYMPTOMS.—Redness and itching of the conjunctiva, lachrymation, some intolerance of light, and stiffness of the globe of the eye, followed by pricking pain, the sensation of a foreign body (as a grain of sand) beneath the eyelid, and the gluing together of the eyelashes, especially on first waking in the morning. The inflammation begins in the conjunctiva of the lids, and gradually extends towards the cornea. It is evidently superficial, of a bright-red colour, and in the form of irregular clusters of tortuous vessels. In acute forms of the disease, the whole eye is covered with a vascular network, the secretion thickens, and becomes puriform or muco-purulent, and patches of extravasated blood are effused beneath the conjunctiva. If the disease extend to the conjunctiva covering the cornea, the vision is obscured. There is no constitutional disturbance, beyond the slight feverishness attendant upon a common cold, when the disease is due to that cause.

CAUSES.—Catarrh; a draught of cold air directed on the eye; foreign bodies in the eye; over-exertion of the sight; the glare of a strong light; all the causes of inflammation in other mucous membranes.

SIS.—From *purulent ophthalmia*, except in severe cases, by character, and by not being contagious. From *inflammation rotic*, by the brighter colour, larger size, and more tortuous the vessels, which are obviously superficial, and shift their the motions of the eyelids; by the abundant secretion; by e of acute pain in and around the orbit; and by the slight of light, existing chiefly at the onset of the attack.

SIS.—*Favourable.* The disease readily yields to treatment, confined to the conjunctiva, does not threaten the loss of n chronic cases, or after repeated attacks, the lids may be- kened, and that part of the membrane which covers the y be rendered opaque, so as to impair the sight.

MENT.—If the disease depend on catarrh, and is attended le symptoms, the treatment proper to catarrh must be em- Dover's powder, in doses proportioned to the age (10 grains dult), may be given at night, with a saline aperient in the or small doses of tartar-emetic, in combination with a saline ay be given two or three times a-day.

al treatment will consist, in severe cases, of cupping or the temple, and scarification of the lids, with fomentations vater or warm decoction of poppies. When the inflammation ne degree subsided, and in mild cases from the first, collyria acetate of lead, sulphate of zinc, sulphate of copper, or silver, must be prescribed. Of these, the last is to be pre- the proportion of four grains to the fluid ounce of distilled

adhesion of the iris to the cornea. The usual constitutional symptoms are restlessness, sleeplessness, a furred tongue, and disordered bowels,—the results of the prolonged local irritation.

DIAGNOSIS.—There is no other disease of the eyes occurring at this early period with which it can be confounded.

PROGNOSIS.—*Favourable*, so long as the cornea retains its transparency. Ulceration of the cornea, according to its degree, threatens injury to, or complete loss of, vision.

CAUSES.—The application of leucorrhœal or gonorrhœal discharges to the eye, during parturition; contagion. The common causes of inflammation ?

TREATMENT.—In severe cases, a single leech should be applied to the upper eyelid, followed by the frequent use of a collyrium, containing one grain of bichloride of mercury, in ℥viii. of distilled water, or from four to ten grains of alum, or four grains of nitrate of silver, in an ounce of distilled water. In chronic cases stronger stimulants may be used; and if the lids present a granular appearance, they may be touched with the solid nitrate of silver or sulphate of copper.

In milder cases, a little simple ointment should be placed between the lids; a collyrium, containing four or five grains of sulphate of zinc or of alum to the ounce of distilled water, should be injected beneath the lids several times in the day; and the bowels should be kept free by gentle aperients of castor-oil, magnesia, or manna.

PROPHYLAXIS.—The contagious nature of the disease requires that the greatest care should be taken to prevent the application of the matter to the eyes of other persons.

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3. PURULENT OPHTHALMIA OF ADULTS.

SYNONYM.—Ægyptian ophthalmia.

SYMPTOMS.—The disease generally attacks both eyes, and sets in with a sensation of a foreign body beneath the eyelids, speedily followed by injection of the conjunctiva, and effusion of serum beneath it, with a discharge of a thick, puriform matter from the surface. The conjunctiva is of a bright-red colour throughout, the lids and anterior surface of the eye are swollen and granular, and the cornea is sunk, as it were, into a deep pit formed by the projection of the conjunctiva. The swelling is mixed here and there with extravasated blood. So long as the conjunctiva alone suffers, the pain is inconsiderable; but when the deeper-seated textures are involved, the pain is extremely severe, and is felt in the globe of the eye, and around the orbit. In the globe itself it is a sensation of painful tension, and around the orbit it is similar to the pain of hemicrania. It is intermittent, or aggravated at intervals, and attains its greatest intensity at night. There is but little intolerance of light in any form of the disease. Rupture

rnea sometimes takes place with permanent or temporary
the pain. The constitutional symptoms are not strongly
the pulse is somewhat increased in frequency, the tongue is
d the sleep disturbed by paroxysms of pain.

NATIONS.—In resolution; chronic inflammation of the con-
granular conjunctiva; opacity, ulceration, or sloughing of
; staphyloma; prolapsis of the iris. The disease is very
ur.

s.—Contagion. The common causes of inflammation?

OSIS.—From *catarrhal ophthalmia* by the greater severity of
ymptoms, and the greater tendency to implication of the
ted parts; when the disease attacks those parts, by the
of the pain in and around the orbit. From diseases affecting
-seated tissues alone, by the presence of severe inflammation
junctiva.

OSIS.—*Unfavourable*, when very severe, or neglected in its
ment. From its tendency to attack the deeper-seated struc-
he eye, loss of vision, or at least injury to the sight, may be
d. The prognosis should, therefore, be guarded.

MENT.—Venæsection to fainting, followed, if the inflamma-
usually severe, by from twelve to twenty-four leeches round
; free scarification, followed by strong astringents, of which
the nitrate of silver ointment (ten grains of nitrate of silver
lard). The solid nitrate of silver, a solution of the same

5. STRUMOUS OPHTHALMIA.

SYNONYMS.—Scrofulous, pustular, and phlyctenular ophthalmia.

SYMPTOMS.—This disease attacks children from the period of weaning, to eight or nine years of age, and sometimes up to the period of puberty. There is slight and partial redness of one eye, or of both eyes, sometimes confined to the eyelids, and caused by groups of enlarged vessels running from the circumference of the eye to the edge of the cornea, where they terminate in small pustules, which break and form minute ulcers. Sometimes the injection extends to the conjunctiva covering the cornea, and pustules are formed upon its surface. There is great intolerance of light, the eyebrows are contracted, and the nostrils and upper lip drawn upwards. There is a profuse flow of scalding tears, whenever the eye is exposed to light, which, flowing over the skin, irritate and inflame it, and sometimes give rise to a pustular eruption, accompanied by white scabs—the *crusta lactea*. The symptoms remit towards evening. The constitutional symptoms are those present in other forms of scrofula, such as glandular enlargements, eruptions on the head and face, sore ears, general debility, tumid belly, disordered bowels, offensive breath.

CAUSES.—*Predisposing.* The scrofulous diathesis, and all the circumstances calculated to call it into action. *Exciting.*—The common causes of inflammation; catarrhal ophthalmia; the exanthemata.

DIAGNOSIS.—From catarrhal ophthalmia, by the more partial injection of the vessels, the greater intolerance of light, the formation of distinct pustules, and the presence of other symptoms of scrofula. From purulent ophthalmia, by its less severity and more chronic course, the absence of acute pain in and about the eye, and the age at which it occurs; the purulent ophthalmia of children occurring soon after birth, and up to the time of weaning, and the purulent ophthalmia of adults, after puberty, while strumous ophthalmia occurs in the interval between weaning and puberty.

PROGNOSIS.—*Favourable*, when the constitution is but slightly affected with scrofula; but *unfavourable*, when the strumous taint is strongly marked.

TERMINATIONS.—In resolution; in the formation of a "vascular speck," or of *pannus;* in ulceration of the cornea, followed in some cases by protrusion of the iris, and its adhesion to the cornea; in infiltration of the cornea.

TREATMENT.—*Indications.* I. To improve the general health. II. To restore the vessels of the eye to their natural state.

I. By the treatment recommended for scrofula. See Scrofula (p. 371). Quinine is deemed the most valuable tonic in this disease.

II. The second indication is fulfilled by warm fomentations to the eye; by vinum opii dropped two or three times a-day into the eye;

or by the use of any of the astringent collyria, with the red precipitate or citrine ointment, placed between the lids at bed-time; and by the counter-irritation of blisters behind the ears, an issue in the arm, or a ring or thread passed through the lobe of the ear. Ulcers on the cornea should be touched with nitrate of silver. The crusta lactea may be removed by a bread-poultice, followed by a lotion containing a scruple of sulphate of zinc to an ounce of water.

SCLEROTITIS—INFLAMMATION OF THE SCLEROTIC.

SYNONYM.—Rheumatic ophthalmia.

This disease is sometimes uncombined with inflammation of other textures of the eye, but more frequently it coexists with inflammation of the conjunctiva (*catarrho-rheumatic ophthalmia*), or of the iris.

SYMPTOMS.—A deep-seated and dusky redness of the globe of the eye, especially around the cornea, where the radiating straight vessels of the sclerotic are seen abruptly terminating a short distance from its margin. There is an abundant flow of tears, intolerance of light, and a sensation of fulness and tension, with darting pains in the globe, extending round the orbit, in the course of the branches of the fifth nerve, increasing towards evening, attaining its greatest intensity at midnight, and subsiding towards morning. There is generally some degree of haziness of the cornea, and vision is more or less impaired.

TERMINATION.—In recovery, or in chronic disease. If the disease extend to the cornea or iris, the results of inflammation of those parts.

CAUSES.—*Predisposing.* Middle age; the male sex; a previous attack; the rheumatic or gouty diathesis. *Exciting.*—The common causes of inflammation. The disease is in itself a form of rheumatism.

DIAGNOSIS.—From inflammation of the conjunctiva by the deep-seated redness and radiated arrangement of the vessels; by the secretion of tears in the place of mucus; by the deep-seated pain of the orbit, extending to the surrounding parts; by the intolerance of light; in some cases, by its complication with iritis.

PROGNOSIS.—*Favourable,* if the disease is promptly treated. It is very liable to assume a chronic form, and to return.

TREATMENT.—In acute cases, venæsection to the approach of fainting, repeated, if necessary, and followed by the free application of leeches to the temple or forehead; warm opiate fomentations and frictions; counter-irritants, with blisters to the temple, or a liniment consisting of equal parts of laudanum and tinct. lyttæ, rubbed frequently into the temple and forehead. The extract of belladonna is also to be applied during the whole course of the disease. The bowels should be freely acted on by mercurial preparations, as by hyd. chloridi, gr. iv., pulv. opii, gr. i., every night, and the vinum colchici combined with laudanum, and a gentle saline aperient (℞. Vin. colch. ʒss.,

tinct. opii ♏x., magnes. sulph. ʒi., magnes. carb. gr. x., aquæ ℥i.) four times a-day.

In the chronic form of the disease, the vinum opii may be dropped into the eye, and tonics may be given, such as the disulphate of quinine, the mineral acids, or the tonic infusions. In obstinate cases, the arsenical solution, in doses of eight to twelve drops three times a-day, is strongly recommended by Dr. Mackenzie.

When inflammation of the sclerotic coexists with inflammation of the conjunctiva, it is called Catarrho-Rheumatic Ophthalmia.

The symptoms, terminations, and treatment of this disease are those of catarrhal inflammation of the conjunctiva, combined with that proper to rheumatic inflammation of the sclerotic. The treatment must be varied as the one or the other disease predominates.

CORNEITIS—INFLAMMATION OF THE CORNEA.

SYMPTOMS.—The disease begins with a slight haze on the cornea, which gradually increases till it amounts to opacity. Numerous minute ulcers now form on the surface, and the vessels of the conjunctiva and sclerotic become injected; those of the conjunctiva ramifying over the surface of the cornea, and giving rise, in extreme cases, to the appearance known as "pannus," and those of the sclerotic being arranged in the characteristic radiated form around the margin of the cornea. Depositions of lymph between the layers of the cornea are also of frequent occurrence; and the secretion of the aqueous humour being augmented, increases the convexity of the membrane. Other complications occur as the inflammation extends to the surrounding textures of the eye. There is generally but slight intolerance of light, accompanied by lachrymation. The pain is also slight, except occasionally in the first stage, when there is a sense of tension in the eye, with darting pains in the forehead.

DIAGNOSIS.—From other chronic affections of the eye, by its limited seat; from more severe diseases of the organ, by its chronic course.

PROGNOSIS.—Generally unfavourable, especially when the general health is much impaired.

CAUSES.—*Predisposing.* The strumous diathesis. Age, from eight to eighteen. *Exciting.*—The common causes of inflammation.

TREATMENT.—In the early stage, local depletion, repeated occasionally in the course of the malady; counter-irritation; warm anodyne fomentations; astringent applications when the disease has become chronic: the pupil to be kept under the influence of belladonna. The constitutional treatment is that of other forms of scrofula. Quinine is particularly useful in this, as in strumous ophthalmia. Should inflammation of the surrounding textures, as of the iris, take place, the treatment proper to iritis will become necessary. (See Iritis.)

IRITIS—INFLAMMATION OF THE IRIS.

SPECIES.—1. Acute; 2. Chronic.

SUB-SPECIES.—Idiopathic; Rheumatic; Arthritic; Syphilitic; Strumous.

1. ACUTE IRITIS.

SYMPTOMS.—The disease begins by the formation of a red zone o small, straight, parallel vessels, arranged as radii round the circum ference of the cornea, and terminating abruptly near its edge, the red ness after a time extending to the conjunctiva. The iris loses its bril liancy, becomes muddy, and of a tint formed by blending a red with its original hue; its texture is at the same time impaired or destroyed and lymph is largely effused into its substance, thrown out from it edge, or deposited upon its anterior or posterior surface, or in all thes situations. Sometimes the quantity of lymph effused is so large as t fill the chambers of the eye. The movements of the iris are at firs impeded, and then altogether suspended; the pupil contracts, and be comes irregular in shape, from effusion into its substance and adhesio to surrounding parts. There is dimness, and at length complete los of vision. There is generally severe pain in the globe and round th orbit, darting to the cheek and temple, and aggravated at night. I severe cases the local symptoms are accompanied by acute fever.

DIAGNOSIS.—The diagnostic marks of this disease are, the change c colour, the irregular shape of the pupil, and the effusion of lymph b hind the cornea. The radiated arrangement of the vessels is comme to iritis and sclerotitis.

PROGNOSIS.—*Unfavourable*, in severe cases, and when the treatmen has been delayed. *Favourable*, in mild cases, and in acute cases whe promptly treated. A contracted pupil, great vascularity, acute an deep-seated pain, and greatly-diminished sensibility or total insensibilit to light, are very unfavourable symptoms.

CAUSES.—*Predisposing*. Gout, rheumatism, syphilitic affection and scrofula. *Exciting*.—Mechanical injuries, surgical operation over-exertion of the eyes, and the common causes of inflammation.

TREATMENT.—*Indications*. I. To subdue inflammation. II. T prevent the effusion and promote the absorption of lymph. III. T prevent the formation of adhesions.

I. Bleeding from the arm to the approach of fainting, repeated necessary, and followed, when the more severe symptoms are subdue by cupping or leeches, brisk aperients, a strict antiphlogistic regime the exclusion of light, and perfect rest.

II. To fulfil the second indication, calomel and opium must be giv from the outset, in doses of two, three, or four grains, with from quarter to half a grain of opium, every three, four, or six hours, a

cording to the severity of the symptoms. In very severe cases it may be well to resort to mercurial inunction. The calomel and opium may be advantageously combined with tartar-emetic in the dose of from one-sixth to one-quarter of a grain.

III. The third indication is fulfilled by the application of the extract of belladonna to the eyebrow and lids once in twenty-four hours.

REMEDIES.—A drachm of oil of turpentine, suspended in a thick mucilage, three times a-day. (Carmichael.)

2. CHRONIC IRITIS.

SYMPTOMS.—Those of the acute form, but less severe, and of longer duration. The same treatment is required, but more or less active according to the severity of the existing symptoms.

SYPHILITIC IRITIS.—The *symptoms* resemble those of idiopathic iritis, but they generally come on slowly and insidiously. When fully established, the disease may prove highly destructive to the eye. The *cause* is, as the name implies, the venereal taint. The disease sometimes occurs alone; at others, in combination with other secondary symptoms; and it may make its appearance during the existence of the primary disorder. It does not occur in children. The *diagnosis* turns on the position in which the lymph is effused, and on its appearance. It is thrown out on the margin of the iris in the form of globules or distinct masses, of a reddish, brownish, or brownish-yellow colour, sometimes described as tubercles. At the same time the pupil is displaced upwards and inwards, the sclerotic zone is of a cinnamon colour, and small brown spots form on the cornea. The *treatment* is that of idiopathic iritis—abstraction of blood, general or local, mercury to affect the gums, and the extract of belladonna applied to the eyelids, to dilate the pupil.

RHEUMATIC IRITIS.—The *symptoms* are those of idiopathic iritis, and the *treatment* in the acute stage is the same. When the acute symptoms have subsided, or in the more chronic forms, quinine, or colchicum may be given with advantage. The patient should avoid exposure to cold. Warm fomentations and hot compresses of linen give relief; counter-irritation also is extremely useful; and stimulant local applications, as the vinum opii, dropped into the eye, in the decline of the disorder.

ARTHRITIC IRITIS.—This disease occurs in persons subject to gout, or of gouty constitution, when weakened by abstinence, or any occasional cause of debility. The *symptoms* bear a general resemblance to those of idiopathic iritis, and in the majority of cases they are those of the acute form. The sclerotic, however, has a peculiar purplish hue, and the radiating vessels stop within one or two lines of the margin of the cornea, leaving a bluish-white ring around that membrane,—appearances which are characteristic of this affection. The disease is very apt to recur. The *treatment* of the acute disease differs from that of acute idiopathic iritis, inasmuch as salivation is less beneficial

and often injurious; preparations of colchicum should therefore substituted for those of mercury, depletion having been previou practised, according to the severity of the disease and the state of t patient's constitution. The disulphate of quinine, Fowler's solutio and the sesquioxide of iron, have also been recommended. The di should be carefully regulated, and abstinence from stimulating artic of food and drink must be enjoined. Warmth locally applied eith dry or moist, and opiate frictions to the forehead and temple comple the treatment.

STRUMOUS IRITIS.—This form is generally the result of an extensi of strumous ophthalmia to the deeper-seated structures, and is chro and obstinate. The constitutional treatment is that of other forms scrofula: the local treatment being determined by the degree and exte of the existing inflammation. The extract of belladonna must applied to the lids, and topical bleeding and counter-irritants may necessary.

CHOROIDITIS—INFLAMMATION OF THE CHOROID.

SYMPTOMS.—Inflammation of this membrane rarely exists alone, a when it begins in it, it speedily extends to the other deeper-seat structures of the eye. The pathognomonic symptom of the disease the formation of a blue zone, of variable width, around the corn followed by the protrusion of small dark-blue tumours, varying size and situation, and accompanied by displacement or contraction the pupil, narrowing of the iris, and opacity of the cornea. The are great pain and intolerance of light, and vision is variously affect in consequence of the pressure on the retina; dimness of vision a actual blindness often supervene early in the disease. The constit tional symptoms are generally inconsiderable.

TERMINATION.—Enlargement of the globe; watery effusion betwe the choroid and retina; absorption of the vitreous humour; inflamm tion and suppuration of the globe; choroid staphyloma.

CAUSES.—*Predisposing.* The strumous habit; adult age; fem sex. *Exciting.*—Injuries, and the common causes of inflammation.

DIAGNOSIS.—By the blue zone round the cornea, followed by t bluish protrusions through the sclerotic.

PROGNOSIS.—Generally unfavourable. There is great danger of t sight being lost or permanently injured.

TREATMENT.—General followed by local bloodletting, mercur aperients, preparations of antimony, the warm bath, and the an phlogistic regimen. In the chronic form, Fowler's solution, in t dose of five or six drops three times a-day. Counter-irritation blisters, the tinctura lyttæ, or the tartar-emetic ointment: punctu of the sclerotic and choroid, to evacuate the serous effusion.

RETINITIS—INFLAMMATION OF THE RETINA.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE INFLAMMATION OF THE RETINA.

SYMPTOMS.—Acute deep-seated pain in the globe of the eye, increased by motion or pressure, and extending to the brow; headache; intolerance of light; dimness or loss of vision, with shining spectra of various forms; and a contracted and motionless pupil. These symptoms sometimes supervene on inflammation of the other textures of the eye. The pain in the eye and head is often succeeded by delirium, and attended with febrile excitement.

TERMINATIONS.—In inflammation of the entire globe, or of the several structures of the eye.

DIAGNOSIS.—The history of the complaint, with the symptoms mentioned in the foregoing description, will serve to distinguish simple retinitis from other simple diseases of the eye. The diagnosis is more difficult when the other textures are implicated.

PROGNOSIS.—In simple acute retinitis, favourable, but guarded. In other cases it must vary with the nature of the complications.

CAUSES.—Strong light; the light and heat of large fires; the light reflected from snow or sand; flashes of lightning; overstraining of the eye in the use of the microscope.

TREATMENT.—Copious abstraction of blood from the arm, followed, if necessary, by leeches round the eye; the antiphlogistic regimen; and calomel and opium, given so as to affect the mouth. In complicated cases the treatment will vary with the nature of the other structures affected. The eye to be shaded from the light.

2. CHRONIC INFLAMMATION OF THE RETINA.

SYMPTOMS.—Those of the acute form in a less degree—pain less acute, some intolerance of light, dimness of vision, bright, dark, or coloured spots before the eye, contraction of the pupil, and sluggish movements of the retina.

CAUSES.—Those of the acute form. The abuse of spirituous liquors? Onanism.

TREATMENT.—Moderate depletion by leeches or cupping to the temples; counter-irritation; a regulated diet; aperients and alteratives; rest to the eye; the eye to be shaded from the light.

AMAUROSIS—NERVOUS BLINDNESS.

SYNONYM.—Gutta serena.

VARIETIES. — 1. Inflammatory (see **Retinitis**); 2. Anæmic; 3. Hysteric; 4. Dyspeptic; 5. Amaurosis from disease of the brain, or injury to the nerves of the eye.

SYMPTOMS.—Blindness, partial or complete, in one or both eyes. When both eyes are affected, the gait of the patient is peculiar; his movements are uncertain, the eyeballs are either fixed or oscillating, his gaze is fixed; the pupil is generally dilated and insensible to light, but sometimes moveable, its independent and associated movements being perfectly performed.

DIAGNOSIS.—From blindness caused by disease of the transparent textures of the eye, by the perfect transparency of the pupil.

CAUSES. — Inflammation of the retina; congestion; plethora; anæmia; hysteria; irritation of the bowels from worms; dental irritation; organic disease of the brain.

TREATMENT.—This must vary with the cause. If the patient has been exposed to any of the causes of inflammation of the retina mentioned under *retinitis*, bleeding, followed by calomel and opium, with antiphlogistic remedies, and perfect rest of the organ, must be resorted to; if there is evidence of unusual fulness of blood, especially in the vessels of the head and face, and the blindness, if partial, is increased by all causes which increase that determination of blood, bleeding and low diet must be prescribed, with a view of reducing existing plethora. If the disease supervene on hæmorrhage, hyperlactation, or other long continued debilitating discharges, the treatment must be that indicated by such a state of system. Hysterical amaurosis, occurring, without other apparent cause, in females subject to hysteric fits, hysteric aphonia, or other anomalous disorders of the nervous system, must be treated as hysteria. When amaurosis is referable to dyspepsia, worms, or other gastric or intestinal irritation, the treatment must be directed to the condition of the alimentary canal. Amaurosis dependent upon disease of the brain, or on irritation of the retina or branches of the fifth pair of nerves, may be occasionally cured by removing the cause. Blindness has, in one reported case, been cured by the removal of a carious tooth, into which a spicula of wood had been introduced, and occasionally it has disappeared under a course of mercury: amaurosis, apparently depending upon pressure within the brain, has been cured by salivation.

In chronic cases, and in the ascertained absence of inflammation of the retina, electricity or strychnine may be resorted to. The electric fluid may be applied by means of sparks drawn from the eyelids and parts around the orbit, and the strychnine may be sprinkled on a blistered surface above the brow, beginning with a sixth of a grain, and increasing the quantity gradually and cautiously.

DISEASES OF THE EAR.

1. OTITIS EXTERNA . . Inflammation of the External Ear.
2. OTITIS INTERNA . . Inflammation of the Internal Ear.

OTITIS EXTERNA—INFLAMMATION OF THE EXTERNAL EAR.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE INFLAMMATION OF THE EXTERNAL EAR.

SYMPTOMS.—Pain in the auditory canal, gradually increasing in severity, and augmented by cold, pressure, and the motions of the jaw; deafness; noises in the ear; redness and swelling of the lining membrane; and after an interval of a few hours, or of one or two days, a thin acrid fetid discharge, often tinged with blood, and at length becoming puriform. The inflammation is followed by enlargement of the mucous follicles, and terminates by suppuration, ulceration, and the formation of scabs, or of painful granulations.

TERMINATIONS.—In resolution, or in the chronic form, accompanied by chronic deafness.

CAUSES.—*Predisposing.* Childhood; the scrofulous diathesis.
Exciting. Cold; the introduction of foreign bodies into the ear; chemical irritants; the stings of insects; the sudden suppression of eruptions of the scalp or face; the extension of inflammation from surrounding parts; the exanthemata.

TREATMENT.—Poultices and warm fomentations to the ear; the injection of warm water, either pure or containing from five to ten grains of acetate of lead to the ounce; in severe cases, leeches behind the ear, blisters or tartar-emetic ointment over the mastoid process; aperients, tartar-emetic in nauseating doses; a spare diet and antiphlogistic remedies. If an abscess should form, poultices and warm fomentations, to promote suppuration and encourage the discharge.

2. CHRONIC INFLAMMATION OF THE EXTERNAL EAR.

SYMPTOMS.—The same as in acute otitis; but less severe, and of long continuance.

TREATMENT.—If the disease is still recent, and the acute stage has only partially subsided, injections of warm water, or of a weak solution of acetate of lead, should be used several times in the day, for several days together, followed by weak astringents, such as solutions of alum, sulphate of zinc, and nitrate of silver, gradually and cautiously increasing their strength. If there are granulations of the mucous membrane, tents of lint or cotton, dipped in a solution of acetate of lead or sulphate of zinc, may be introduced into the meatus. The general treatment will consist in the steady use of aperients and alter-

atives, nourishing diet, pure air, and cleanliness; and if there is much debility, tonics, of which steel is the best. If the discharge should suddenly cease, and symptoms of head affection occur, hot poultices and fomentations should be applied to the external ear, at the same time that the head affection is met by appropriate remedies.

OTITIS INTERNA—INFLAMMATION OF THE INTERNAL EAR.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE INFLAMMATION OF THE INTERNAL EAR.

SYMPTOMS.—Acute, deep-seated pain in the ear, and in the head and face of the same side, which is increased by mastication; a sense of tension in the ear; loud noises; deafness; sometimes swelling of the tonsils, with dull pain or itching at the back of the throat. There is a frequent, quick, and hard pulse, hot skin, anxious countenance, furred tongue, anorexia, general febrile excitement, restlessness, sleeplessness, and, in very severe cases, delirium and convulsions.

TERMINATIONS.—In resolution, with gradual subsidence of the symptoms. In suppuration, accompanied by throbbing pain and extreme tension, followed by a discharge of matter by the external meatus, the membrana tympani having been ruptured, or through the Eustachian tube into the throat, or through an opening in the mastoid process.

CAUSES.—Those of inflammation of the external ear; the extension of inflammation from the throat through the Eustachian tube.

DIAGNOSIS.—From inflammation of the external ear by the deeper-seated pain, the absence of discharge from the external meatus in the early stage of the disease, and the results of an examination of the external ear. The rupture of the membrana tympani may be recognised by causing the patient to expire forcibly, the mouth and nostrils being closed, when air will issue from the ear.

PROGNOSIS.—Deafness is a very common consequence of this disease; and inflammation of the dura mater, and other membranes of the brain, an occasional result.

TREATMENT.—Bleeding, followed by cupping or leeches behind the ear, and counter-irritation, by blisters or tartar-emetic ointment, brisk purgatives, and nauseating doses of tartar-emetic. If there is reason to believe that suppuration has taken place, and there is extreme tension, with throbbing pain in the ear, and violent headache and delirium, instantaneous relief may often be afforded by puncturing the membrana tympani, washing the ear out repeatedly with tepid water, and facilitating the discharge of matter from the tympanum, by

causing the patient to lie on the affected side. If there is swelling or inflammation in the fauces, astringent gargles should be prescribed, or the steam of warm water should be inhaled. If there is reason to believe that the Eustachian tube is obstructed, the air-douche or the ear-catheter may be employed.

2. CHRONIC INFLAMMATION OF THE INTERNAL EAR.

SYMPTOMS.—The principal symptoms of chronic inflammation of the ear, whether external or internal, is a discharge of mucus, muco-purulent, or purulent matter (otorrhœa), from the external meatus, with deafness more or less complete.

TERMINATIONS.—In caries of the temporal bone; destruction of the bones of the ear; cerebral disease; or permanent deafness.

TREATMENT.—The same as in chronic inflammation confined to the external ear, combined with the use of gargles, the air-douche, or the ear-catheter, with the precautions laid down in works on Diseases of the Ear. The purely medical treatment will be regulated by the existing state of the constitution. If it is connected with scrofula or syphilis, the remedies proper to those diseases; if combined with skin diseases affecting the head and face, the remedies required by the particular form of skin disease; if with a deranged state of the digestive organs, aperients and alteratives. Wholesome diet, cleanliness, pure air, proper exercise, and a strict attention to the state of the bowels, with tonics and alteratives, should be particularly insisted on in all forms of the disease.

CHAPTER VIII.

CUTANEOUS DISEASES.

ORDERS.

1. EXANTHEMATA	Rashes.
2. VESICULÆ	Vesicles.
3. BULLÆ	Blebs.
4. PUSTULÆ	Pustules.
5. PAPULÆ	Pimples.
6. SQUAMÆ	Scales.
7. TUBERCULÆ	Tubercles.
8. MACULÆ	Spots.

DEFINITIONS.

1. *Exanthemata. Rashes.*—Superficial red patches, variously shaped, circumscribed, or diffused, disappearing on pressure, and terminating by resolution, deletescence, or desquamation.

2. *Vesiculæ. Vesicles.*—Small, round, pointed elevations of the cuticle, containing a transparent and colourless, or opaque and pearly, lymph. They break and discharge their contents, and are succeeded by scurf, scales, or open sores. Sometimes their contents are absorbed.

3. *Bullæ. Blebs.*—Vesicles of larger size.

4. *Pustulæ. Pustules.*—Circumscribed elevations of the cuticle, containing pus, and terminating in thick crusts or scabs.

5. *Papulæ. Pimples.*—Small, firm, pointed elevations of the skin, usually terminating in scurf; rarely by ulceration of the summit.

6. *Squamæ. Scales.*—Hard, opaque layers of cuticle, covering papulæ or inflamed surfaces; and continually detached and renewed.

7. *Tuberculæ. Tubercles.*—Small, hard, solid, persistent tumours, larger than papulæ, with or without an inflamed base, imbedded in the skin, and terminating in resolution, partial suppuration, or destructive ulceration.

8. *Maculæ. Spots.*—Permanent discolorations, or decolorations, of the skin, often accompanied by change of structure.

Diseases of the skin admitting of no exact classification;—lupus, pellagra, malum Alepporum, syphilida, purpura, elephantiasis Arabum, and cheloidea.

ORDER I.

EXANTHEMATA—RASHES.

RUBEOLA . . .	Measles (p. 344).
SCARLATINA . .	Scarlet-fever (p. 349).
ERYSIPELAS . .	St. Anthony's Fire (p. 298).
ERYTHEMA . .	Inflammatory-blush.
URTICARIA . .	Nettle-rash.
ROSEOLA . . .	Rose-rash.

ERYTHEMA—INFLAMMATORY-BLUSH.

SYNONYMS.—Intertrigo; maculæ volaticæ; tooth-rash; gum.

SPECIES.—Erythema fugax; erythema læve; erythema papulatum; erythema tuberculatum; erythema centrifugum; erythema nodosum.

SYMPTOMS.—Red patches of variable form and extent, disappearing on pressure, with little or no swelling, heat, pain, or fever. Not contagious, nor in itself attended with danger.

TERMINATIONS.—In resolution without desquamation, or with slight desquamation (E. fugax and E. læve); or in a sero-purulent exudation of a disagreeable odour (E. intertrigo).

CAUSES.—Friction and pressure; heat and cold; acrid discharges, as those of coryza, leucorrhœa, or gonorrhœa, and the urine and fæces; irritation of internal parts, as in dentition; difficult menstruation; dyspepsia; tension of the skin, as in anasarca.

DIAGNOSIS.—From *erysipelas*, by the redness being lighter and more superficial, and the swelling less; by the absence of heat and pain; and by its milder character, and more favourable termination. From *roseola*, by the peculiar rosy tint of the latter. From *rubeola* and *scarlatina*, by the semi-lunar patches of the first, and by the great extent and deep-red hue of the last. Also by the peculiar constitutional symptoms and contagious character of these diseases.

PROGNOSIS.—Favourable; but it is sometimes chronic and permanent, especially when occurring on the legs in aged persons.

TREATMENT.—When idiopathic, it soon disappears of itself, or yields to gentle aperients, spirit lotions, and the warm bath. If symptomatic, the treatment is that of the primary disease.

The following varieties of erythema deserve attention:—*Erythema papulatum*, occurring in young persons of both sexes, on the trunk and upper extremities, in small, round, and slightly-prominent patches, which disappear entirely in the course of a few days; *erythema tuberculatum*, in which the patches are larger, more prominent, and more permanent; *erythema nodosum*, which occurs chiefly in children and young persons of both sexes, on the extremities, especially the forepart

of the leg, its form rounded or oval, its size varying from that of a fourpenny-piece to that of a five-shilling piece, at first slightly raised above the surface, but in a few days assuming the form of red painful tumours. The colour gradually changes from red to blue; the tumours soften, and disappear in from a week to a fortnight. It is generally preceded by loss of appetite and slight constitutional symptoms. *Erythema centrifugum*, appearing mostly on the cheek, as small round raised patches, which gradually spread from a small pimple till they cover a considerable extent of surface. Heat and redness continue for several days, and are often connected with menstrual disorders.

These varieties of erythema either disappear of themselves, or under the use of gentle aperients, and cold lotions. In very severe cases, small doses of tartar-emetic may be combined with saline aperients; and Goulard's lotion, or an alkaline lotion containing a drachm of carbonate of potash to a pint of water, may be kept constantly applied.

URTICARIA—NETTLE-RASH.

SYNONYMS.—Essera; aspretudo; febris urticata; papulæ cuticulares.

SPECIES.—1. Urticaria evanida; 2. Urticaria febrilis.

1. URTICARIA EVANIDA.

SYMPTOMS.—An eruption resembling in appearance, and in the intolerable itching which accompanies it, the stinging of nettles. The spots often appear suddenly, especially if the skin be rubbed or scratched, and seldom last many hours, sometimes not many minutes, but vanish, to appear on another part of the skin. Sometimes the rash assumes the form of long wheals, as if the part had been struck with a whip or cane. The swellings are always firm and solid, and contain no liquid. In some persons, the eruption lasts only a few days, in others many months or years, appearing and disappearing at intervals. The rash generally disappears in the daytime, to return in the evening, and is accompanied by slight feverishness. It terminates in desquamation.

CAUSES.—*Predisposing.* Peculiar constitution. *Exciting.*—Handling the leaves of the common nettle. Shell-fish; mushrooms; honey; vinegar; cucumbers; salad. Strawberries and several other fruits and articles of diet will cause urticaria in certain persons; also valerian, turpentine, and copaiba.

DIAGNOSIS.—By its close resemblance to the sting of the nettle, the itching that attends it, and its fugitive character.

PROGNOSIS.—It generally disappears under the use of simple remedies; but may last for months or years.

TREATMENT.—If caused by irritating food, an emetic, followed by a gentle aperient. In chronic cases, warm or vapour, alkaline or sulphur, baths; with a strictly-regulated diet, aperients, and alteratives. In obstinate cases, Fowler's solution (five or six drops three times a-day). The smarting may be allayed by lotions of acetate of lead, or cyanide of potassium, or by the warm bath.

2. URTICARIA FEBRILIS.

SYMPTOMS.—This is generally caused by some article of food which has disagreed with the patient. There is more or less fever or constitutional disturbance, followed by heat and tingling of the body; and then by an eruption, beginning on the shoulders, loins, and inner surface of the arms and thighs, and round the knees, consisting of irregularly-shaped pale blotches, surrounded by a deep-red border, but soon assuming a uniform deep-red colour, and accompanied by intense itching. The blotches appear and disappear several times in the course of the disease, and gradually subside in a few days or a week. There is generally an increase of itching and smarting towards evening. The *treatment* is that of urticaria evanida, but more active. After an emetic of ipecacuanha, a saline aperient may be given three or four times a-day. (Magnes. Sulph. ʒi., Magnes. Carb. gr. x., Vin. Ant. Pot. Tart. ʒss. Aq. Menthæ pip., Aquæ, āā ʒss.)

ROSEOLA—ROSE-RASH.

SYNONYMS.—Rosalia; rosacia; rubeola spuria.

SPECIES.—Roseola infantilis; roseola æstiva; roseola autumnalis; roseola annulata.

SYMPTOMS.—Slight febrile symptoms, succeeded by deep-red patches of various size and form, appearing on different parts of the body, and generally disappearing in one or two days, or a week.

CAUSES.—Teething; irritation of the stomach and bowels; drinking cold water when the body is heated; severe exercise. The disease is sometimes epidemic, and it occasionally precedes the eruption of the small-pox, occasioning some difficulty in the diagnosis.

DIAGNOSIS.—From measles and scarlet fever, by the mildness of the constitutional symptoms, and the absence of the catarrhal symptoms of the one, and the sore throat of the other.

PROGNOSIS.—A favourable termination after a few days or a week.

TREATMENT.—Saline aperients with small doses of tartar-emetic two or three times a-day; and an occasional warm bath.

The following species require attention:—*Roseola infantilis.* An eruption of numerous small distinct circular patches, of a deep rose-

red colour, occurring in infants from dentition or intestinal irritati —*Roseola æstiva.* This form is most common in children a females. It is preceded by symptoms of fever, sometimes of cons derable severity, accompanied by delirium and even by convulsio The rash, which is of a deep-red colour, and attended with itchi and pain, and sometimes with an inflamed throat, with some difficul in swallowing, commonly appears between the third and seventh da on the face and neck, whence it rapidly spreads over the rest of t body. It lasts about three or four days, and then disappears. T *roseola autumnalis* is a less severe affection, occurring also chiefly children, and presenting larger patches, seated mostly on the upp extremities. *Roseola annulata,* appearing, as the name implies, rosy rings, enclosing a portion of healthy skin, and gradually spreadi The rash is most common on the belly, loins, buttocks, and thigh It may be acute or chronic, and is generally dependent upon some d order in the primæ viæ.

ORDER II.

VESICULÆ—VESICLES.

VARICELLA	Chicken-pox (p. 344).
ECZEMA	Running Scall.
HERPES	Tetter.
SCABIES	The Itch.
MILIARIA	Miliary-fever.

ECZEMA—RUNNING SCALL.

SYNONYMS.—Humid tetter; crusta lactea.

SPECIES.—1. Acute; 2. Chronic.

1. ACUTE ECZEMA.

VARIETIES.—Eczema simplex; eczema rubrum; eczema impe ginodes.

SYMPTOMS.—An eruption of small slightly-raised vesicles, crow together on broad irregular patches of bright-red skin, accompanied severe tingling and smarting. The fluid in the vesicles soon becon opaque and turbid, and, in four or five days, the vesicles burst, t fluid is discharged, and dries into thin yellowish-green scabs. Fr vesicles form on the surrounding skin, while the parts alrea affected are kept moist by constant exudation. When the eruption of some standing, the skin presents a highly-inflamed surface, studd with a large number of minute pores, which are covered with th white membranes. Its usual duration is from a week to a month.

CAUSES.—Predisposing. The female sex; the seasons of spr

and autumn. *Exciting.*—Intense heat; the irritation of blisters; frictions with mercury (*eczema mercuriale*); the handling of dry powders, flour, metals, &c. Contagion?

DIAGNOSIS.—From *scabies*, by the vesicles of eczema being more clustered and less pointed; by the smarting of eczema contrasted with the itching of scabies. From *miliaria*, by the absence of severe constitutional symptoms; and of profuse perspiration. From *lichen agrius*, by the presence in the latter of distinct papulæ, and by the deeper colour of the skin. From *psoriasis*, by the vesicles, and the thinner scales; and by the absence of fissures, except in the bendings of joints and the natural folds of the skin.

PROGNOSIS.—*Favourable*, but often difficult of cure.

TREATMENT.—Aperients, cooling drinks, simple diet, warm baths, and the water-dressing. If attended with much inflammation or fever, general or local depletion, with a more strict antiphlogistic diet, brisker aperients combined with antimonials, and emollient applications, such as local baths of marsh-mallow or bran, or poultices of potato-flour. The distressing tingling and smarting of the rash may be relieved by decoction of poppy-heads, or by a lotion consisting of two grains of the bicyanuret of mercury, or three grains of the cyanide of potassium, to an ounce of distilled water. Preparations of sulphur, and greasy applications generally should be avoided. If the disease has been incurred by the employment of the patient, it may be necessary to oblige him to desist from following it.

The following varieties require special notice:—*Eczema simplex.*—A mild form, free from constitutional disturbance, mostly attacking women and young children on the arm and forearm, and between the fingers, generally terminating in resolution. *Eczema rubrum.*—The skin is inflamed, hot, and tense, of a bright-red colour, and covered with small vesicles surrounded by an inflamed areola. The rash generally terminates in about a week, with slight exfoliation of the cuticle; but in more severe cases, the inflammation increases, the vesicles coalesce, the contained serum becomes opaque, and at length escapes as an irritating fluid, which forms loose thin incrustations, and these falling off, display a highly-inflamed surface. The disease either disappears in two or three weeks, the healing process beginning at the margins, or it becomes chronic. *Eczema impetiginodes.*—In this form, the inflammation, which is still more acute and rapid in its progress, is accompanied by much swelling and tension, and some fever; and the contents of the vesicles becoming purulent, dry into soft yellow scabs, which fall off, and are reproduced, displaying an inflamed surface covered with a reddish serosity. It generally terminates in about a month, the skin gradually assuming a more healthy appearance; or it runs into the chronic form. It is distinguished from impetigo by being at first vesicular, whereas impetigo is a pustular disease from the beginning; and by the thinner scabs.

2. CHRONIC ECZEMA.

SYMPTOMS.—This is a sequel of the acute form, and often very intractable. The skin, from the continued abundant discharge of acrid serum and the reproduction of the vesicles, is highly inflamed and marked by fissures at the joints. Sometimes, however, there is no exudation, but the surface is cracked and covered with shining crusts, beneath which the skin is of a bright-red colour. The disease often spreads from a small point over a considerable extent of surface, and is accompanied by intense itching and smarting, which is particularly distressing when the eruption occupies the inner surface of the thighs, the verge of the anus, or the vulva of females. When it attacks the face, the conjunctiva of the eye is involved, and there is much smarting, with some intolerance of light. The eruption often lasts for years, being heightened and renewed at spring and autumn; and sometimes, after the resources of art and the patience of the sufferer are exhausted, rapidly disappears.

CAUSES.—*Predisposing.* Obscure. *Exciting.*—Intestinal irritation; painful dentition; dysmenorrhœa.

TREATMENT.—That of the acute form, when the inflammation is severe. When less acute, alkalies administered internally and applied externally; the alkali being combined with one of the bitter infusions. Plummer's pill, or small doses of tartar-emetic with hyd. c. creta, may be given as an alterative three times a-day. In obstinate cases, one of two remedies—tincture of cantharides or arsenic—the first in doses of three or four drops three times a-day, gradually increased; the second in the form of Fowler's solution, in doses of five or six minims three times a-day, also cautiously increased. These remedies may be combined with infusion of quassia; or they may be given with ammonia or iron, according to the existing state of the system. The sulphur bath, or a bath containing three ounces of sulphuret of potassium, may be used with advantage. Vapour baths, or the vapour douche, may also be recommended. The itching and smarting are best allayed by the zinc ointment mixed with spirits of wine (ung. zinci. ʒi. spt. rectif. ʒi.) smeared over the surface, and renewed once or twice a-day, or by simple cold-water dressing. A handkerchief, moistened with a teaspoonful of chloroform, placed near the seat of irritation, and covered with the bed-clothes, often allays the smarting. A solution of nitrate of silver (ten grains to the ounce) will also sometimes afford great relief.—(G.)

HERPES—TETTER.

SYNONYMS.—Dartre; olophlyctide.

SPECIES.—Herpes phlyctenodes; herpes labialis, and preputialis; herpes zoster; herpes circinatus; herpes iris.

SYMPTOMS.—The rash begins as circumscribed groups of distinct

vesicles on an inflamed base; but the vesicles soon coalesce, and their contents, which were at first watery, soon become yellowish-white or yellow, escape and form a scab. This soon falls off, leaving an inflamed surface, which rapidly heals. The eruption is commonly preceded by slight constitutional symptoms, and sometimes by acute darting pain, which, when the eruption has made its appearance, changes to heat and smarting. The disease is rarely attended with any danger, and generally lasts about a week or ten days.

Herpes phlyctenodes is the name given to those varieties of the disease which have no particular seat. *Herpes labialis* occupies, as the name implies, the lips, but may extend to the nose, cheeks, and chin; it also attacks the mucous membrane of the lips and mouth. It is a very common accompaniment of catarrh, and of inflammatory affections of the mucous membrane of the mouth, throat, and stomach; and it often constitutes a critical rash in ague. *Herpes preputialis* attacks the internal or external surface of the prepuce, and is preceded and accompanied by itching and smarting. It is easily distinguished from syphilis when recent, and afterwards by its history. The sore remaining after the vesicles have burst is superficial, and readily healed by separating the two surfaces of the prepuce by lint. *Herpes zoster, zona, or the shingles*, is very characteristic in its appearance, position, and course. As the name implies, it surrounds the body like a zone or girdle, beginning somewhere about the mesian line, and travelling round one-half the body, below the nipple, at the lower part of the back and groin, or at the upper part of the thigh. It is often preceded for several days, or even longer, by very acute darting pains. It runs a mild course, and disappears in two or three weeks. *Herpes circinatus.*—This form is arranged in rings, with a red border, and a centre of sound skin. *Herpes iris.*—A very rare variety, consisting of four rings of different shades of colour.

CAUSES.—*Predisposing.* The female sex; youth and middle age; but it occasionally occurs in old people. *Exciting.*—Catarrh; inflammation of the mucous membranes; indigestion.

DIAGNOSIS.—From *pemphigus*, by the smaller size and greater number of the vesicles. From *eczema*, by the greater distinctness of the vesicles, and, generally, by the smaller size of the patches. The situation of herpes labialis and preputialis, and the peculiar course and arrangement of herpes zoster, serve to distinguish those varieties. *Herpes circinatus* is distinguished from patches of *lepra*, from *porrigo scutulata*, and *lichen circumscriptus*, by its vesicular character.

PROGNOSIS.—*Favourable.* The disease lasts from a week or ten days to a month, and in rare cases longer.

TREATMENT.—Gentle aperients with antimonials, a regulated diet, and local applications of warm mucilaginous liquids. The constitutional treatment must be determined by the age and state of system. The vesicles may be punctured with advantage, and friction should be guarded against. Mild cases get well without treatment.

SCABIES—THE ITCH.

SYNONYM.—Psora.

SYMPTOMS.—The usual seat of this eruption is between t
on the wrists, inside of the forearm, and at the bends of t
but it may affect any part of the body except the face. It
makes its appearance within a few days of the exposure to
tagion, and is preceded for one or two days by itching, i
towards evening and at night, and by all causes which ex
circulation. The eruption consists either of pale rose-coloure
ples, or of pointed vesicles, containing serum, and raised slightly
the surface. In severe cases these vesicles increase in size, and
filled with pus (scabies purulenta), or they are destroyed by fr
and leave small round dark spots. The pimples or vesicles are
single or in small groups; rarely in patches of any size. The di
is accompanied throughout by most distressing itching.

CAUSES.—*Predisposing.* Youth; the male sex; the season
spring and summer; high temperature; neglect of personal cleanlin
Exciting.—Contagion; the *acarus scabiei.*

DIAGNOSIS.—The vesicular and pustular forms of scabies are d
tinguished from *prurigo*, by the latter being a papular eruption, situate
generally on the trunk or lower extremities, not contagious, and occu
ring mostly in old persons. When scabies assumes the papular form
and the summits of the pimples are scratched off, so as to leave rou
dark spots, it is difficult to distinguish from *pruritus senilis.* In suc
cases advanced age affords a probability in favour of the latter; whil
the fact of more than one member of the same family being affected, is
conclusive as to the former. From *lichen*, by the latter being papular
more clustered, and, if situated on the hand, being at the back of th
hand, and not between the fingers. From *herpes* and *eczema*, by th
vesicles being more isolated, and in smaller clusters, by the intens
itching and by their contagious nature, and often by their situation
The fact that scabies does not attack the face, distinguishes it from al
skin diseases having that seat.

PROGNOSIS.—*Favourable*, but sometimes obstinate. Its more usu
duration is a week or ten days, but it may continue for months.

TREATMENT.—Sulphur ointment, or an ointment of sulphur an
carbonate of potash; sulphur baths; sulphuret of lime, with olive oil;
a lotion of super-sulphate of potash (sulphate of potash ʒiv., sulphuric
acid ʒss., water Oiss.); hellebore ointment; an ointment of hydriodate
of potash; a strong alcoholic solution of stavesacre. Cleanliness an
the warm bath, and gentle aperients if required, are useful auxiliaries.

PROPHYLAXIS.—Personal cleanliness is a sure preventive of itch.

MILIARIA—MILIARY FEVER.

SYMPTOMS.—This disease sets in with rigors, extreme debility, depression of spirits, and a sense of tightness and oppression about the præcordia, with shortness of breath, and, in some instances, a teasing cough, followed by increased heat of surface, with wandering pains and restlessness. After these symptoms have continued from two to five or six days, a *profuse sweat*, of a sour, rank odour, makes its appearance, accompanied by a harassing pricking or itching of the skin. On an *uncertain day*, a number of small red or white papulæ, about the size of millet-seeds, perceptible to the touch, are observed first upon the neck and breast, whence they gradually extend to the trunk and extremities. After *ten or twelve hours*, a small vesicle appears upon the top of each pimple. The contents of the vesicles are at first transparent, but afterwards become white; and they have a peculiarly offensive odour. In *two or three days* the vesicles break, and are succeeded by small crusts, which fall off in scales; or the disease terminates in resolution, or by desquamation. The febrile symptoms do not subside on the appearance of the eruption, but after a variable interval.

CAUSES.—*Predisposing.* Lax habit of body; childhood; old age; the female sex; the period of childbirth; debility, however induced; excessive evacuations; long-continued and copious menstruation; fluor-albus; the presence of irritating matter in the primæ viæ; abuse of tea-drinking. *Exciting.*—Immoderate sweating, produced by excessive heat, or by heating medicines. Too much bed-clothes and warmth in the puerperal state.

DIAGNOSIS.—By the uncommon anxiety and dejection of mind; the profuse sweating, and the peculiarly fetid, rank odour of the perspiration. Afterwards, the characteristic appearance of the eruption.

PROGNOSIS.—*Favourable.* The fever assuming a mild form, and remitting on the appearance of the eruption; the papulæ of a florid red colour. *Unfavourable.*—The persistence of the sweating, with increase of fever after the appearance of the rash; great anxiety and depression of spirits; profound coma; the sudden disappearance of the eruption, followed by great prostration of strength, anxiety, shortness of breath, rapid, weak, and intermitting pulse, violent vomiting, delirium, and convulsions; the appearance of petechiæ interspersed among the papulæ; anasarcous swellings.

TREATMENT.—*Indications.* I. To diminish the immoderate heat and sweating. II. To support the strength of the patient.

I. The first indication will be accomplished,

(*a*) By the cautious application of *cold*;—the air of the bed-room should be cool; part of the bed-clothes should be removed, and the patient should be desired to lie with the arms exposed.

(*b*) By gentle *saline aperients*, with the milder mercurial preparations.

(*c*) By mineral *acids*; especially the dilute sulphuric acid, given in the infusion of roses, or with decoction of bark or quinine.

II. The second indication requires,

Ammonia, or wine; and, where there is great restlessness, opium.

The skin may be washed with a weak solution of chloride of lime.

ORDER III.

BULLÆ—BLEBS.

PEMPHIGUS . .	Vesicular Fever.
RUPIA	Atonic Ulcer.

PEMPHIGUS—VESICULAR FEVER.

SYNONYMS.—Bullæ; phlyctena; pompholix; hydatis; febris bullosa; febris vesicularis.

SPECIES.—Pemphigus infantilis; pompholix solitarius; pompholix diutinus.

SYMPTOMS.—The rash is ushered in by the usual symptoms of the cold stage of fever; lassitude, headache, sickness, oppression, frequent pulse, and, in some instances, delirium. On an *uncertain day* an eruption takes place of red circular patches, which soon terminate in pellucid blisters, similar to those produced by a burn, resting on an inflamed areola, and distended with a straw-coloured serum. They appear on the face, neck, trunk, arms, mouth, and fauces, and vary in size from that of a sixpence to that of a half-crown. In a few days the blisters either break and discharge a yellowish, bland, or sharp ichorous fluid, or they begin to shrink, and in a short time disappear.

Pemphigus infantilis attacks young infants in lying-in hospitals. It has been mistaken for syphilis. *Pompholix solitarius* is characterised by the appearance of a single bleb at a time, on successive days, or at short intervals. *Pompholix diutinus* is a chronic disease, occurring, for the most part, in middle-aged and old men, lasting for a considerable time, and sometimes extending over the entire body.

CAUSES.—*Predisposing.* The male sex; adult and old age; summer season. *Exciting.*—Unwholesome and scanty food, bad ventilation, and all the causes of cachexia. Specific infection?

DIAGNOSIS.—From *vesicular eruptions*, by the large size and isolation of the vesicles. From *rupia*, by the absence of thick scabs. From *ecthyma*, by the contents of the blebs being transparent. From *erysipelas*, by the regular form and isolated situation of the blisters.

PROGNOSIS.—Generally *favourable*, but often chronic.

TREATMENT.—That of the concomitant fever, and varying with its type. In common cases, gentle saline aperients, with antimonials, and

acid drinks. When the disease occurs in cachectic constitutions, alteratives with tonics or stimulants, and a generous diet, will be required.

The local treatment will consist in puncturing the vesicles as they appear; and if there is much pain, applying warm poultices or fomentations to the inflamed spots.

RUPIA—ATONIC ULCER.

SYNONYM.—Ulcus atonicum.

SPECIES.—Rupia simplex; rupia prominens; rupia escharotica.

SYMPTOMS.—This disease consists in round, flattened, and isolated blebs, about the size of a shilling, filled with serum, which changes after a time to pus. These blebs shrink, and become covered with thick brownish scabs, which, when they fall off, leave ulcers that either heal or continue open for a while. The disease attacks weakly and cachectic subjects, and runs a chronic course, lasting from a few weeks to several months. Its most common seat is the lower extremities.

Rupia simplex is the mildest form of the disease, and answers to the above description. *Rupia prominens* is named from the greater thickness of the scabs, which are formed by several layers of hardened secretion, assume a conical shape, and an appearance not unlike that of an oyster-shell in miniature. The blebs are larger, and the inflammation and subsequent ulceration more extensive than in rupia simplex. *Rupia escharotica* affects infants in the interval from birth to the first dentition, is accompanied by much constitutional disturbance, and sometimes terminates fatally. The ulcers left after the separation of the scabs heal slowly, secrete a fetid sanies, and are apt to spread.

CAUSES.—*Predisposing.* A cachectic state of the system. *Exciting.*—Obscure.

DIAGNOSIS.—From *pemphigus*, by the thick laminated scab, the inflammatory areola, and subsequent ulceration. From *ecthyma*, by the blebs at first containing serum; but in severe cases, the secretions soon becoming purulent, renders the diagnosis difficult.

PROGNOSIS.—*Favourable.*, except in the more severe cases of rupia escharotica.

TREATMENT.—*Local.* Warm baths; alkaline baths; emollient applications, and if the ulcerations are obstinate, nitrate of silver, dilute mineral acids, or stimulating ointments. *General.*—Tonics or stimulants, with alteratives, according to the state of the patient; and strict attention to diet, ventilation, and cleanliness:—the treatment, in a word, of cachexia.

ORDER IV.

PUSTULÆ—PUSTULES.

VARIOLA	Small-pox (p. 334).
VACCINA	Cow-pox (p. 341).
ECTHYMA	Ecthyma.
IMPETIGO	Running Tetter.
ACNE	Copper Nose.
SYCOSIS	Chin Welk.
PORRIGO	Scald Head.
EQUINIA	Glanders (p. 369).

ECTHYMA.

SYNONYMS.—Farunculi atonici; phlyzacia agria; scabies fera

SYMPTOMS.—The eruption begins in the form of distinct ind circumscribed spots, which increase till they attain a considerable Pustules form on the centre, and sometimes enlarge till they c resemble the larger bullæ of rupia. In two or three days the pa dry up, and thick scabs form, which falling off, leave a purpl coloration of the skin, or in severe cases, and in greatly-im constitutions, an unhealthy ulcer. The eruption is sometimes a panied by pain, and by slight febrile symptoms.

CAUSES. *Predisposing.*—Childhood and old age. *Exciting.* the causes of cachexia.

DIAGNOSIS.—From *acne, impetigo, sycosis, porrigo, and i purulenta,* by the larger size of the pustules, and their inflame indurated base. From *variola,* by their size, the absence of the c depression, and their non-contagious nature. From *vaccina,* l cellular structure of the latter, and its contagious nature.

PROGNOSIS.—*Favourable;* but sometimes chronic and tedious.

TREATMENT.—Emollient applications, and if the ulcers ass chronic form, nitrate of silver, or the dilute nitric or muriatic a stimulating ointments. Gentle aperients and alteratives, who food, pure air, exercise, cleanliness, and sea-water or alkaline bat

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IMPETIGO—CRUSTED TETTER.

SYNONYMS.—Running tetter; scale; cowrap.

SPECIES.—Impetigo figurata; impetigo sparsa; impetigo la impetigo granulata.

SYMPTOMS.—The eruption appears in the form of clusters of pustules, slightly raised above the skin, which burst in from

three days, and discharge a purulent fluid, that hardens into thick, yellow, semi-transparent incrustations, resting on an irregular, inflamed base, moistened by a sero-purulent fluid. The eruption may disappear in a few weeks, or it may continue for months or years, the existing patches being succeeded by fresh groups of pustules. There is some constitutional disturbance, with intense heat and itching of the parts affected.

Impetigo figurata generally occurs in defined patches on the cheeks, but may attack any part of the body. It is most common in spring, and in young children, especially during dentition. *Impetigo sparsa* is more irregular in its distribution, and is most frequently seen on the extremities, and around the joints. Its most common period is the autumn; and it may assume either an acute or chronic form. *Impetigo larvalis* attacks the scalp, ears, and lips in infants. It may also occur on the cheek, which it covers with a thick, yellowish-white crust, resembling a mask, whence its name. In one of its forms it receives the name of *crusta lactea*. *Impetigo granulata* appears as a number of whitish-yellow pustules, each traversed by a single hair, accompanied by severe inflammation and itching, bursting in from two to four days, and pouring out a sero-purulent matter, which hardens into hard, rough, brownish crusts, which have a nauseous odour, and are sometimes found filled with lice. The disease is most common in uncleanly persons.

CAUSES.—*Predisposing.* The seasons of spring and autumn; infancy and childhood; the lymphatic temperament. *Exciting.*—The application of irritating substances to the skin; unwholesome diet; impure air; want of cleanliness. The disease is not contagious.

DIAGNOSIS.—The pathognomonic character is the formation of clusters of small pustules (psydracia), succeeded by scabs of varying tints, from whitish-yellow to dark brown. When it attacks the chin, from *sycosis*, by the smaller size of its pustules, and the less copious exudation. From *porrigo*, by not being contagious, and not destroying the hair; and by the peculiar character of the scab. (See Porrigo.)

PROGNOSIS.—*Favourable*, in the young and in its acute forms. Obstinate and difficult of cure in the old and in chronic forms.

TREATMENT.—In cases of unusual severity, bleeding from the arm, or leeches near the seat of the disease, with antiphlogistic remedies, may be required. In less severe cases, emollient applications, tepid baths, the vapour douche, and gentle aperients. The troublesome itching may be relieved by a prussic-acid lotion, containing half an ounce of dilute prussic acid, and the same quantity of alcohol, in an eight-ounce lotion. In chronic impetigo, in addition to tepid baths, alkaline lotions to the skin; the sulphur bath; the dilute acids, or a weak solution of nitrate of silver. Stimulating ointments (sulphuris iodidi ʒi, ung. simp. ℥i.) may also be usefully applied. In obstinate cases, Fowler's solution.

ACNE—COPPER NOSE.

SYNONYMS.—Varus; gutta rosea.

SPECIES.—Acne simplex; acne indurata; acne rosacea; acne punctata; acne sebacea.

SYMPTOMS.—This disease attacks the sebaceous follicles of the skin in the form of isolated pustules, seated on a hard, red base, and terminating in indolent chronic tumours. Its primary form is, in most cases, a hard, red pimple. It is most commonly seen on the nose, cheeks, temples, and forehead, but frequently appears on the back and upper part of the chest, and sometimes on the neck and shoulders. It may exist in all these situations in the same person. It is a chronic disorder, not accompanied by constitutional symptoms, is most frequent from puberty to the age of thirty-five; and occurs in both sexes.

Acne simplex answers to the foregoing description, its most common situation being the shoulders and upper part of the chest: but it also occurs on the face. *Acne indurata* consists in the formation of hard indurated tumours by the union of several of the smaller follicles. Its most common seat is the face, but it often occupies the back of the trunk. *Acne rosacea* is generally met with in old persons, and its common seat is the nose and cheeks. As the name implies, the disease is attended with a rosy colour of the skin, which, however, is not permanent, but changes at length to a violet tint. In extreme cases, the superficial veins enlarge, and the cellular tissue, to some depth, becomes inflamed and hardened (acne indurata). *Acne punctata* derives its name from a small black point, which forms on the summit of each pimple. *Acne sebacea* is named from the smooth waxy appearance which the eruption sometimes assumes.

DIAGNOSIS.—By the small-sized pustule situated on the hardened base; and by the situation of the disease.

PROGNOSIS.—In *acne simplex*, favourable. It often disappears of itself with the advance of age. *Acne indurata* and *acne rosacea* are often very obstinate, and defy all modes of treatment.

CAUSES.—Hereditary predisposition; dyspepsia; excess in eating and drinking; uterine disorders; change of life; the application of irritating substances to the skin of the face.

TREATMENT.—In young and vigorous subjects, when the disease is recent, a restricted diet, and the avoidance of all stimulating liquors, gentle aperients, and, in extreme cases, general bloodletting, with spirit lotions, or lotions of the acetate of lead. In chronic cases, and in acne *indurata*, the same general treatment, varied according to the constitution and state of the patient. The local treatment will consist of frictions, with an ointment of iodide of sulphur (a scruple of the iodide to an ounce of lard), or a paste of sulphur and milk. Dilute acids or the nitrate of silver cautiously applied to the eruption, &c.

a lotion of two grains of the bicyanuret of mercury to an ounce of distilled water, are also beneficial. This lotion should be applied with a camel's-hair pencil, and, after a short interval, washed off with cold water. A course of alterative medicines may be given at the same time. A drop of creasote in a mucilaginous draught may also be given with advantage two or three times a-day. *Acne rosacea* requires a very careful regulation of the diet, proper exercise, abstinence from stimulating liquors, avoidance of heated apartments, hot fires, and mental excitement, together with the local application of the vapour douche, or the lotion of bicyanuret of mercury. In very obstinate cases of acne, blisters have sometimes been applied with advantage.

SYCOSIS—CHIN WELK.

SYNONYM.—Mentagra. Tynea sycosa.

SYMPTOMS.—Redness, tension and smarting of the skin of the chin, lower jaw, or upper lip, followed by an eruption of small red points, which, in the course of a day or two, ripen into distinct pointed pustules, traversed by a single hair. After five or six days more, the pustules burst, discharge their contents, and form thin brownish scabs, which fall off, and are sometimes not renewed, the disease terminating in from ten days to a fortnight. When the disease has continued for some time, the beard falls off. In chronic cases the skin of the parts affected is covered with tubercles.

CAUSES.—*Predisposing.* The male sex; youth; the seasons of spring and autumn. *Exciting.*—Irritants; heat; neglect of cleanliness. Contagion? The disease is alleged to originate in a peculiar species of cryptogame.

DIAGNOSIS.—By the situation of the eruption; and the small-pointed pustule, on a hard base.

PROGNOSIS.—*Favourable*, but guarded. It is often very obstinate.

TREATMENT.—Emollient fomentations, cooling drinks, and laxatives, when the disease is acute. In severe cases, antiphlogistic remedies. The hair should be cut close. In chronic cases, and when the tubercles are large, frictions, with stimulating ointments, or the local application of the dilute acids, or a dilute solution of lunar caustic, or the lunar caustic in substance. The vapour bath or douche, or the sulphur bath, may also be used with advantage; and ointments of iodide of sulphur and protiodide of mercury. Mercury as an alterative, and preparations of iron, have been found useful.

PORRIGO—SCALD HEAD.

SYNONYM.—Tinea.

SPECIES.—Porrigo favosa; porrigo scutulata; porrigo decalvans.

SYMPTOMS.—Small round pustules, seated on the hairy scalp, and containing a yellow matter, which concretes so as to form a hard, prominent scab, presenting a central depression. The disease generally attacks children, but is not confined to young persons. There are no febrile symptoms. The seat of the disease is the hair follicles.

Porrigo favosa, favus; porrigo lupinosa; honeycomb scale. This form is not confined to the scalp, but may attack the chin, eyebrows, or forehead, and, in rare instances, the trunk or extremities. It presents, when fully formed, a peculiar thick yellow scab, marked by numerous depressions, and bearing some resemblance to a honeycomb. The scabs have an offensive odour, resembling that of the mouse, the skin of which animal has been found infested by the same parasitic plant, the *Achorion Schönleinii*. The *porrigo scutulata*, or ringworm, like the foregoing, occurs chiefly on the scalp, but is sometimes seen on the forehead and neck, and still more rarely, as the result of direct contact, on other parts of the body. It is arranged in the form of rings, enclosing a centre which is less thickly covered with pustules. The hair ultimately falls off from the part affected, leaving a shining bald patch. When the disease is of some duration, it may be seen at the same time in all its stages—the red patches, the cluster of yellow pustules, crusts of various thickness, and bald spots. When the disease has disappeared, the hair is slowly reproduced, and sometimes is never replaced. This form of the disease, too, is attributed to a parasitic plant, the *Trichophyton tonsurans*. The *porrigo decalvans* consists of circular bald patches, without any distinct eruption on the surface, and surrounded by hair of a perfectly natural appearance. Though bearing the name of porrigo, it ought, perhaps, to occupy a place by itself. It also is believed to be caused by a vegetable parasite.

CAUSES.—*Predisposing.* Scrofula; age from seven to fourteen. *Exciting.*—Contagion.

DIAGNOSIS.—By the contagious character of the eruption, the clustered pustules, the rough pitted scab, and the subsequent baldness.

PROGNOSIS.—The disease is often obstinate, and of long duration.

TREATMENT.—The hair must be cut close with sharp scissors, and well washed, and the scabs must be softened with warm fomentations or poultices. The best local application, in the great majority of cases, is the iodide of sulphur ointment: when this does not prove successful, a strong solution of nitrate of silver, or the dilute mineral acids, especially the sulphuric, or creasote, or a saturated

solution of sulphurous acid, may be used. The mixed vapour of iodine and sulphur applied to the patch through a flexible tube is strongly recommended by Dr. Burgess. The powder used to generate the vapour consists of from four to eight grains of iodine to an ounce of sulphur; the vapour to be applied three times a-day. The general treatment consists in the use of tonics, especially the preparations of iron, with aperients as often as necessary. *Porrigo decalvans* is best treated by repeated applications of a strong solution of nitrate of silver.

There is a disease of the hair allied to the present class of cutaneous disorders, but almost unknown in this country—the *plica polonica*. It consists in an inflamed and tender state of the scalp, and a swollen condition of the hairs, which are glued together into a compact mass by a viscid and offensive secretion. Two parasitic plants — the Trichophyton tonsurans and Tricophyton sporuloides — are said to accompany it, and are thought to be the cause of it. Nothing is known of the appropriate treatment, but the disease seems to be aggravated by cutting the hair. The best chance of cure would seem to be afforded by the application of stimulants in the form of vapour, such as the mixed vapour of iodine and sulphur.

ORDER V.

PAPULÆ—PIMPLES.

LICHEN.
PRURIGO.

LICHEN.

SYNONYMS.—Papulæ siccæ; scabies sicca vel agria.

SPECIES.—Lichen simplex; lichen strophulus; lichen urticatus; lichen agrius; lichen syphiliticus.

SYMPTOMS.—An eruption of small, hard pimples, sometimes of the colour of the skin, sometimes red, generally arranged in patches or clusters, and accompanied by severe itching. Its most common situations are the hands, forearms, neck, and face, but it may attack other parts of the body. It is generally a chronic disorder, but sometimes assumes an acute form. Its usual termination is in desquamation.

Lichen simplex answers to the foregoing description. *Lichen strophulus*, commonly known as *red gum*, *white gum*, or *tooth-rash*, attacks children at the breast, or during dentition, is an acute affection, and generally continues for three or four weeks. It has received many names, according to the arrangement of the pimples, and the colour of the skin. *Lichen urticatus* is characterised by the large size of the papulæ, and their close resemblance to the sting of nettles. In *lichen agrius*, the papulæ are confluent, and seated on a highly-inflamed base; the pimples ulcerate and discharge a sero-purulent fluid, which

dies into small scabs, and these falling off, are replaced by thin scales. It is accompanied by intense smarting pain. *Lichen syphiliticus* is characterised by the coppery hue of the rash.

CAUSES.—*Predisposing.* The seasons of spring and summer. *Exciting.*—Extreme heat; irritants applied to the skin; the handling of dry powders; abuse of ardent spirits; grief; disorders of the stomach and bowels; and in children, the irritation of teething; the syphilitic taint.

DIAGNOSIS.—By the papular form of the eruption, the severe itching, and its non-contagious character.

PROGNOSIS.—Lichen is not dangerous, but troublesome, and sometimes difficult of cure.

TREATMENT.—In its acute forms, and especially in severe cases of lichen agrius, general bloodletting is sometimes required, with low diet, brisk aperients, and the antiphlogistic regimen, and tepid emollient applications. Chronic cases require stimulating applications; such as a wash of subcarbonate of potass, ointments of iodide and biniodide of mercury (ʒi. to ʒi. of lard), and sulphur and iodine vapour. In obstinate cases, Fowler's solution may be necessary.

PRURIGO—PRURITUS.

SPECIES.—Prurigo mitis; prurigo formicans; pruritus senilis.

SYMPTOMS.—A chronic disease, in which the papulæ are of the colour of the skin, larger than those of lichen, and accompanied by intolerable itching. It may occur on any part of the body, but is most common on the neck and shoulders. In some instances it attacks the external parts of generation in both sexes, or the verge of the rectum. The papulæ are apt to be torn by friction, and to present on their summit a minute clot of blood, which gives to the rash a very characteristic appearance.

Prurigo mitis presents a smaller-sized pimple than the *prurigo formicans*, and is attended with less itching. In the latter disease, the itching is greatly increased by the warmth of bed. *Pruritis senilis* is accompanied by greater dryness of the skin, and in some cases by large numbers of minute insects; whence the term *pedicularis*.

CAUSES.—*Predisposing.* Childhood and old age, and the seasons of spring and summer. *Exciting.*—All causes of debility, and cachexia; want of cleanliness; unwholesome food, privation, grief, friction, irritation of the skin or of the mucous membranes.

DIAGNOSIS.—From *lichen*, by the larger size of the pimples, by the dark spot on their surface, and by the more severe itching.

PROGNOSIS.—Very difficult of cure, especially in aged persons.

TREATMENT.—In prurigo mitis and formicans, tepid baths, gentle

aperients, with antimonials; and in severe cases, an antiphlogistic regimen. In pruritus senilis, the sulphur ointment, the sulphur bath, or the mixed vapours of iodine and sulphur. For the destruction of lice, a wash of bichloride of mercury, or the unguentum veratri.

ORDER VI.

SQUAMÆ.—SCALES.

LEPRA VULGARIS	Scaly Leprosy.
PSORIASIS	Dry Tetter
PITYRIASIS	Dandriff.
ICTHYOSIS	Fish-skin.
PELLAGRA	Italian Leprosy.

LEPRA VULGARIS—SCALY LEPROSY.

SPECIES.—Lepra alphoides; lepra nigricans.

SYMPTOMS.—The eruption begins in the form of small round shining spots, slightly raised above the skin, and becoming soon covered with a thin white scale, which, falling off, leaves the surface of the skin red and slightly crusted. The spot increases in size, still retaining its circular form, and is covered by a thicker scale, raised at the circumference, and depressed towards the centre, and of a peculiar shining, silvery appearance. These patches vary in size, from that of a shilling to that of a five-shilling piece. Their most common situation is the neighbourhood of the large joints, especially the knees and elbows, but they may appear on any part of the body, with the exception generally of the face and hands. The spots are often arranged symmetrically on the upper and lower extremities. In cases of long standing, several of the original spots coalesce, and form large scaly patches of a very irregular shape.

Lepra alphoides is characterised by the small size of the patches, and the silvery appearance of the scales which cover them. *Lepra nigricans* is a rare disease, distinguished chiefly by its darker colour.

CAUSES.—*Predisposing.* The season of autumn; male sex; adult age. *Exciting.*—Obscure.

DIAGNOSIS.—From *syphilitic lepra*, by the absence of the copper or violet colour, and the greater thickness of the scales. From *porrigo*, by the situation, which, in lepra, is rarely on the scalp, and by its distinct scaly character. From *psoriasis*, by the more regular shape of the patches.

PROGNOSIS.—The disease is essentially chronic, obstinate, and difficult of cure, and disappears and returns without obvious cause.

TREATMENT.—This is chiefly local, consisting in the application of the tar ointment, or of the iodide of sulphur ointment, and of sulph

and salt-water baths; and if the disease resist this treatment, preparations of arsenic, or tincture of cantharides internally. The iodide of arsenic (the tenth of a grain three times a-day), and the vapour of sulphur and iodine applied by means of a tin box or jar. (Dr. Burgess.) The constitutional treatment must depend on the existing state of health.

PSORIASIS—DRY TETTER.

SPECIES.—Psoriasis guttata; psoriasis diffusa; psoriasis inveterata; psoriasis gyrata.

SYMPTOMS.—A chronic affection of the skin, consisting of irregular patches, often of considerable size, slightly raised above the surface, fissured, and covered with a white scale. There is some degree of itching, especially at night, but no marked constitutional disturbance. It attacks the eyelids, lips, prepuce, scrotum, backs and palms of the hands, and nails, and in some of these situations has received distinct names. Psoriasis palmaris (grocers' and bakers' itch) and Psoriasis dorsalis (common in washerwomen) are common varieties.

Psoriasis guttata generally attacks adults in the form of small round, red patches, often combined with the other forms. *Psoriasis diffusa* is more irregular in shape and size. The patches are often of considerable extent, marked by large fissures, and commonly situated on the limbs. *Psoriasis inveterata* is a very severe form of the disease, and generally occurs in old persons, and in debilitated habits. The skin, in the progress of the disease, becomes hard, thickened, and covered with a shining scale, which, when removed, leaves a red, fissured, painful, and bleeding surface. *Psoriasis gyrata* occurs in spiral-shaped stripes, generally on the back. It is very rare.

CAUSES.—*Predisposing.* Hereditary predisposition; adult age; spring and autumn; scrofula. *Exciting.*—Abuse of spirituous liquors; unwholesome food; handling of dry powders. It is not contagious.

DIAGNOSIS.—From *lepra* (see Lepra). From *eczema*, by the absence of vesicles, and the larger size and greater thickness of the scabs; from *lichen agrius*, by the absence of papulæ in the early stage.

PROGNOSIS.—A very obstinate and intractable disease, especially in old and weakly persons.

TREATMENT.—After a short course of mild aperients, and strict regulation of diet, with emollient fomentations, alterative medicines, such as a Plummer's pill, or a pill containing the fifth of a grain of the biniodide of mercury, with the external application of the iodide of sulphur ointment, or of the mixed vapour of iodine and sulphur. In bad cases of psoriasis inveterata, preparations of arsenic, iodine, mercury, or phosphorus. Donovan's solution of arsenic, iodine, and mercury, is a valuable combination of the first three substances. (In

psoriasis inveterata attacking delicate anæmic females, Liq. Pot. Arsenitis ♏v., Tr. Ferri sesquichloridi ♏xx., Infus. Quassiæ, ℥i. is a good combination. The itching and smarting are sometimes greatly relieved by a lotion consisting of ten grains of cyanide of potassium in six ounces of almond emulsion.) (G.)

PITYRIASIS—DANDRIFF.

SPECIES.—Pityriasis capitis; pityriasis rubra; pityriasis versicolor; pityriasis nigra.

SYMPTOMS.—The disease consists of an efflorescence made up of a great number of small circular spots of a red, yellow, dark-brown, or black colour, accompanied by abundant desquamation of branny scales, which are constantly renewed. Its most common seat is the scalp, but it attacks other parts of the body. There is itching of the skin, slight in some cases, severe in others; but no constitutional disturbance.

Pityriasis capitis occurs at all ages, and often in new-born infants. It is attended by slight itching, and friction detaches numerous white branny scales. *Pityriasis rubra* is distinguished by the red colour of the skin. The coloured portions consist at first of small spots which coalesce and spread gradually over large portions of the surface. In *pityriasis versicolor*, the colour of the skin has different shades of yellow and brown, and the skin is covered, as in the other species, by an abundant fur. *Pityriasis nigra*, as the name implies, is characterised by the black colour of the skin.

CAUSES.—*Predisposing.* Youth and old age; female sex; debility. *Exciting.*—Irritation of the skin by heat, by the strong rays of the sun, or by chemical or mechanical irritants.

DIAGNOSIS.—By the characters above described.

PROGNOSIS.—Generally obstinate and difficult of cure.

TREATMENT.—Cleanliness; tepid baths; and tonic and alterative medicines. Alkaline and lead lotions, the zinc or lead ointments, the ointment of nitrate of mercury, and sulphurous baths. The itching may be allayed by lotions containing prussic acid.

ICTHYOSIS—FISH SKIN.

SYMPTOMS.—The whole body, or certain parts only, especially the palms of the hands, soles of the feet, face, eyelids, outer surface of the limbs, and the joints, are covered by a number of small, hard, thick, dry, dark-brown scales, overlapping each other, like the scales of a fish, without any accompanying inflammation, pain, or itching of the skin. The rash often has a very disagreeable odour.

CAUSES.—Obscure; hereditary predisposition. The disease is generally congenital.

DIAGNOSIS.—By the foregoing characters.

PROGNOSIS.—Not attended with danger; but when hereditary, incurable; and when not hereditary, very obstinate.

TREATMENT.—The local treatment most likely to be of service is the vapour-bath, followed by the mixed vapours of sulphur and iodine. The internal remedies indicated are arsenic, or some of its combinations, of which the best is the iodide of arsenic.

PELLAGRA—ITALIAN LEPROSY.

SYMPTOMS.—This disease is allied to psoriasis. It sets in in the spring of the year with dusky-red shining patches on the feet and back of the hands, which gradually spread, become studded with tubercles, and covered with dry scales, intersected, as in psoriasis, by cracks and excoriations. The rash is accompanied by slight itching. It subsides and disappears towards autumn, to return the following spring in a more severe form, accompanied by anxiety, depression of spirits, and convulsive seizures. Towards the end of autumn the disease again subsides, but less completely, and reappears early the following year; and now extends to every part of the surface, the skin being dry, tough, and shrivelled like that of a mummy. Extreme debility, diarrhœa succeeded by dysentery, dropsy, and epilepsy, follow each other, and wear the patient away, or usher in dementia or mania.

CAUSES.—Obscure. Common in Lombardy and the north of Italy.

TREATMENT.—The disease is believed to be incurable.

ORDER VII.

TUBERCULÆ.

LEPRA TUBERCULOSA . . .	Elephantiasis.
FRAMBŒSIA	The Yaws.
MOLLUSCUM	Molluscum.

LEPRA TUBERCULOSA—ELEPHANTIASIS.

SYNONYMS.—Elephantiasis Græcorum; lepra Egyptiaca; lepra Hebræorum.

SYMPTOMS.—The disease commonly sets in with erythematous patches, upon which an eruption of soft, livid tumours, of variable size and irregular shape makes its appearance. The skin and the sub-

jacent tissues are hypertrophied and œdematous, and the parts affected ultimately attain an enormous size. The sensibility of the skin is heightened at first, but subsequently diminished. In very severe cases, the tubercles become inflamed and ulcerated, and discharge an offensive sanies, which concretes into black scabs. The adjoining textures, even to the bones, sometimes become implicated, and their structure completely changed. The constitutional symptoms are merely such as result from the prolonged sufferings of the patient. The disease may occur on any part of the body, but it is most common on the lower extremities and face.

CAUSES.—*Predisposing.* Hereditary taint; the causes of scrofula; certain climates. *Exciting.*—Obscure.

DIAGNOSIS.—The disease cannot be confounded with any other.

PROGNOSIS.—Generally unfavourable.

TREATMENT.—Stimulating applications externally, and arsenical preparations or cantharides internally, in combination with tonic infusions. Change of climate is sometimes beneficial.

FRAMBŒSIA—THE YAWS.

SYMPTOMS.—The disease sets in, without any marked premonitory symptoms, in the form of clusters, of variable size and shape, of small dark-red spots resembling flea-bites. Upon these spots papulæ are developed, which degenerate into indolent vegetations, firm, slightly inflamed, and covered with thin dry scales, and resembling, when found in circular groups, raspberries or mulberries. In some instances they become the seat of ulceration, and of a yellow or bloody discharge, which concretes into scabs. The surrounding skin is generally indurated.

CAUSES.—*Predisposing.* The climate of the West Indies, and of parts of America and Africa; scrofula. It is very rare among the white population. *Exciting.*—Contagion.

DIAGNOSIS.—By the peculiar appearance of the eruption.

PROGNOSIS.—Generally favourable. It sometimes assumes a chronic form, and continues for years.

TREATMENT.—The local application of stimulating ointments, such as the ointment of arsenic, or of the binitrate, protiodide, or biniodide of mercury; caustic, or the actual cautery. Internally, tonics and alteratives, and mercurial preparations in small doses; and in chronic cases, the preparations of arsenic. Warm and vapour baths and douches may also be used with advantage.

MOLLUSCUM.

)MS.—Numerous indolent tubercles, from the size of a pea to
igeon's egg, of various forms, sessile or pedunculated, of the
lour of the skin, containing an atheromatous matter, unac-
by any constitutional disorder, and not attended by pain,
ion, or ulceration. They may occur on any part of the
e their first appearance in childhood, and generally continue
whole of life.

.—Obscure. One form of the disease is contagious.

MENT.—Fowler's solution was administered by Bateman with
nd a solution of sulphate of copper by Biett.

ORDER VIII.

MACULÆ—SPOTS.

eases belonging to this order are of little practical importance.
sist either in change of colour (colorationes) or loss of colour
tiones). To the former belong the common freckle (lentigo),
(spilus), the several forms of nævus, and the liver-spot
; to the latter, the universal colourless state of the skin

phureous waters. The local treatment consists in the use of slightly-stimulating washes, of which the sulphuret of potash (one ounce in a quart of water) is the best.

FARUNCULUS—BOIL.

SYMPTOMS.—Boils consist of hard circumscribed dark-red tumours of the cellular membrane, accompanied by troublesome itching and smarting, sometimes terminating in resolution, but more frequently passing on into suppuration and the slow discharge of matter by a single small orifice, or by several small openings. Several of these boils follow each other in quick succession, and may continue to harass the patient for weeks together. Their most common situations are the neck, back, and nates. They are attended with slight constitutional disturbance.

Carbuncles are boils of larger size and more marked character, and are attended by extensive sloughing of the cellular membrane.

CAUSES.—*Predisposing.* Debility, cachexia, and old age. *Exciting.*—Obscure. Boils and carbuncles have been greatly on the increase of late years; and the mortality from carbuncles in the metropolis has risen from 1, 2, 3, or 4 per million, per annum, from 1840 to 1846, to from 7 to 36 per million, per annum, in the interval from 1847 to 1854.

DIAGNOSIS.—From *phlegmon*, by the slow progress and subacute character of the inflammation, and the scanty formation and incomplete discharge of matter. Carbuncles are characterised by the extent of the sloughs.

PROGNOSIS.—Boils are often tedious, but rarely fatal. Carbuncle, especially in aged persons, is often attended with great danger.

TREATMENT.—In mild cases, saline aperients to keep up a free action of the bowels, and poultices to the boils, when inflamed and painful. In more severe cases, the boils to be freely incised and then poulticed. In carbuncle, free crucial incisions, followed by poultices, and a generous diet, with wine and stimulants. In lingering cases, a course of alterative medicines (Pil. Hyd. Chloridi c. gr. v. bis vel ter die) or alkalies, such as liquor Potassæ (Liq. Potassæ ♏ xx., Infus. Calumbæ, ℥ss. ter die), or the Bicarbonate of Potash in scruple doses.

LUPUS—THE WOLF.

SYNONYMS.—Lupus vorax; herpes exedens; formica corrosiva.

SPECIES.—Superficial, deep-seated, and tubercular lupus.

SYMPTOMS.—This disease, in all its forms, is characterised by its tendency towards destructive ulceration of the parts which it attacks.

Its most common point of attack is the nose; but it may occur on other parts of the face, and very rarely on the trunk or extremities.

The *superficial* form of lupus is sometimes confined to the skin, from which the cuticle exfoliates, and leaves the true skin red, shining, and tender to the touch, and bearing a close resemblance to the recent scar of a superficial burn. The redness disappears on pressure. When the disease is arrested, it leaves the skin thin and shining, and as if seared by a hot iron.

The *deep-seated* form of the disease generally attacks the alæ of the nose, and is often preceded by redness, swelling, pain, and mucous discharge from the nostrils. The skin first swells and assumes a violet-red colour. After an interval, a small ulcer forms, covered by a scab, beneath which a gradual destruction of the part takes place, first of the skin, and then of the cartilages of the nose. In extreme cases, the whole nose and even the palate and gums are destroyed; but in some instances, the disease lasts for years without occasioning any great amount of destruction.

The *tubercular* form consists in numerous small, soft, red tubercles, which remain stationary for a few weeks, months, or years, till they suddenly become inflamed and enlarged; their bases unite, and their summits ulcerate, forming an irregular-spreading ulcer, covered by a dark tenacious crust. The parts first attacked sometimes partially heal, leaving irregular cicatrices, which become the seat of fresh tubercles and of renewed ulceration. The most common seat of this form is the cheek, but it may occur on the neck and chest, and on the anterior surface of the extremities.

Lupus with hypertrophy is generally confined to the face, and consists in the formation of numerous soft, indolent tumours, which rarely ulcerate, but enlarge at their bases, and the skin and cellular tissue become hypertrophied. The entire face, in this manner, sometimes attains an enormous size, and is hideously disfigured.

These forms may exist together, leading to the destruction of the nose, eyelids, and lips, and producing very great deformity. They are rarely accompanied by any marked constitutional symptoms.

CAUSES.—*Predisposing.* The periods of childhood and youth; less frequently the adult age up to 40; the female sex; the scrofulous diathesis. *Exciting.*—Obscure. It is not contagious.

DIAGNOSIS.—From *acne*, by the absence of pustules. From *tubercular lepra*, by the insensibility of the skin, and the peculiar fawn colour of the tubercles in this latter disease. From *cancer* by the latter beginning in a single point, surrounded by a hard, circumscribed base, and accompanied by severe darting pains; the ulcers presenting a fungous appearance. From *syphilis*, by the peculiar copper tinge of the syphilitic eruption, and the coexistence of other secondary symptoms. From *impetigo*, by the dark-brown, thick, and adherent crusts, those of impetigo being yellow, rough, and loosely attached.

PROGNOSIS.—*Favourable*, when recent and limited. *Unfavourable*, when of long continuance and extensive.

TREATMENT.—This must be chiefly local, and will consist, where the ulceration has not set in, of friction with stimulating ointments containing the iodides of sulphur, mercury, or ammonia. When ulceration has set in, caustics must be used, such as nitrate of silver, caustic potass, the chlorides of antimony or zinc, the nitrates or iodides of mercury, and the preparations of arsenic; the animal oil of Dippel has also been recommended. The best applications are powders containing arsenic (one or two grains of arsenious acid to an ounce of calomel, to be applied in small quantity to a limited surface of the skin, Dupuytren); or (arsenious acid ten grains, sulphuret of mercury two scruples, animal charcoal ten grains, to be used with caution, and applied to a small surface at a time, Frère Côme); or (a strong solution of bicyanuret of mercury, 3 or 4 grains to an ounce of water, Burgess); or (a lotion containing one part of chloride of zinc to four of water, Dr. Byron). Among the internal remedies which deserve a trial, Donovan's solution (see Formula 389) may be mentioned.

CHELOIDEA.

SYNONYMS.—Cancroide; keloide.

SYMPTOMS.—This is a rare disease, appearing as small, hard, indolent tubercles, generally isolated, but sometimes occurring in groups, with intervals of sound skin between them. They are of an irregular oval, square, or angular shape, of a rose or a red colour, with a depressed centre, and covered with a thin layer of wrinkled cuticle; and having a remote resemblance to a crab or tortoise—whence the name. The usual situation of these tumours is the space between the mammæ. They are generally chronic, and unattended with danger.

DIAGNOSIS.—By the peculiar appearance above described.

TREATMENT.—The local application of the sulphureous douche, of plasters containing iodine, or iodine and opium, and alkaline baths.

SYPHILIDA—SYPHILITIC ERUPTIONS.

Syphilitic eruptions assume a great many different forms. They may be exanthematous (syphilitic roseola), vesicular (syphilitic rupia), pustular (syphilitic ecthyma), tubercular, papular (syphilitic lichen), or scaly (syphilitic psoriasis and syphilitic lepra); and they may occur either soon after infection,—in which case they are usually accompanied by other constitutional symptoms, and are termed *primary*—or they may come on after an interval, more or less considerable, when they are termed *secondary*. The appearances which distinguish the several syphilitic eruptions from those which most nearly resemble them, are *the colour*, which is coppery, and most distinctly perceived

kin on the stretch; *the form*, which is generally cir-
situation, which is most commonly the face, forehead,
the back and shoulders. Syphilitic ulcers are round,
is, and the scars depressed; syphilitic scales of a dusky
d dry; and the scabs, of a greenish tint, thick, dry, and

arance of the eruption is not sufficiently characteristic,
will often be materially assisted by the history of the
the symptoms which have preceded or accompanied it.
mmon accompaniments of the syphilidæ are ulcerations of
palate; periostitis, which attacks chiefly the tibia, ulna,
l bones of the skull; and iritis. Ulcers of the sides of
and the thickening of the mucous membrane covering its
less common accompaniments.
ment of syphilitic eruptions consists in the cautious use of
loride or bichloride of mercury, or the iodide of potassium
s. The protiodide of mercury is also an excellent medicine
e cases. The muriate of gold (dose, one-tenth of a grain),
ubcarbonate of ammonia, in full doses, may be mentioned
e remedies which have been used with success. Among
ications, which are chiefly required in the tubercular form,
entioned the protonitrate, and the iodides, of mercury, in the
intment, and the iodide of sulphur. Warm, vapour, and sul-
hs and douches may also be used with advantage. In very
ses, opium in full doses may be advantageously combined with
r remedies; and when the skin is very irritable, lotions
oide of potassium. It is usual to administer
secondary cases; but these
certain

There is a second class of skin diseases which, though not usually accompanied by severe general symptoms, require constitutional remedies—namely, the several syphilitic eruptions, which are removed by the same remedies that cure other secondary symptoms—viz., the preparations of mercury and iodine. In the majority of these cases no local remedies will be required; but should they be deemed necessary, the same principles will guide us in our selection as preside over the choice of local remedies in other diseases of the skin. As these diseases are essentially chronic, stimulant applications are indicated, and of these the best will be such as assist us in our general treatment—viz., the preparations of mercury or iodine.

Another class of skin diseases also require constitutional treatment. They are such as occur in scrofulous constitutions, or in impaired states of health. The treatment indicated is such as would be adopted in scrofula, whatever form it assumes, and in similar impaired states of constitution. The local treatment will be governed by the same general principles as apply to similar states of skin; but it may be laid down as a general rule that scrofula, being a disease characterised by want of power, the local applications should be of a somewhat stimulating character.

A fourth class of skin diseases requiring constitutional treatment consists of those in which, whatever may be the form of the eruption, the skin is the seat of inflammation. In all such cases, those remedies are indicated which are effectual in the cure of inflammation of other parts. Of all these remedies, the most effectual is tartar-emetic in the dose of an eighth of a grain or more, either alone, or in combination with small doses of the milder preparations of mercury, or with saline aperients. General or local depletion may be necessary in extreme cases.

A fifth class of cases requiring constitutional treatment consists of those obstinate chronic diseases of the skin, which are found to resist all local applications, and the more simple constitutional remedies, such as aperients, alteratives, and tonics. In such cases, experience has shown the great benefit to be derived from small doses of arsenic, cantharides, phosphorus, or the biniodide of mercury, which probably act by inducing a peculiar condition of the capillary vessels.

These are the five leading cases of skin disease which especially require constitutional treatment. The general remedies administered in other cases will depend upon the age and existing state of health. In the young and robust, mild antiphlogistic treatment and regimen; in the aged and feeble, tonics or stimulants, according to the degree of the existing debility, and the more or less advanced age of the patient; in dry states of skin, antimonials and sudorifics; in the pruriginous eruptions, alkaline medicines; in eruptions attended with copious exudation, the mineral acids.

In all cases of skin disease, it is important to attend to the state of the digestive organs. The bowels should be kept free, and alterative remedies should be given, if the functions of the liver are sluggishly

performed; and dyspepsia must be met by the remedies appropriate to its existing form.

The *local* treatment of skin diseases, where no particular application is recommended by experience, must be regulated, in a great degree, by the presence or absence of marks of severe inflammatory action. Where much inflammation is present, simple water-dressing, cooling washes and ointments, and emollient lotions and baths, will be required, aided in some cases by the application of leeches near the seat of the eruption. When the inflammation is attended by abundant discharge, flour or starch in fine powder may be thinly scattered over the surface.

When inflammation is absent, an opposite plan of treatment is necessary, and we must endeavour to establish common inflammation by the aid of stimulant ointments and washes, in the hope of superseding by this means the peculiar and often languid action of the vessels. Ointments of sulphur, iodine, and mercury, lotions of the bicyanuret of mercury and sulphuret of potassium, and the vapours of sulphur and iodine, are among the most efficient local stimulants.

The more obstinate skin diseases, as well as those which are accompanied by rapid destruction of the textures of the skin, require the use of still stronger stimulants and escharotics, among which the most effectual are the nitrate of silver, arsenical paste or powders, the acid nitrate of mercury, the chloride of zinc, and phosphorus.

When there is extreme irritability of skin, with or without inflammation, sedative lotions such as the decoction of poppyheads or dulcamara, applications containing prussic acid, and the vapour of chloroform, may be used with advantage. In eruptions accompanied by much exudation, the dilute mineral acids would seem to be indicated, and alkaline washes in pruriginous eruptions.

There is one disease, scabies, which depends on the presence of a peculiar insect, the acarus scabiei: this is destroyed by sulphur and by other strong stimulants.

Several formulæ for the local treatment of skin diseases will be found in the collection of Formulæ, under the title "External Stimulants, containing Preparations of Mercury, Arsenic, Iodine, Phosphorus, &c.;" and for the constitutional treatment under the head of "Alteratives."

For more minute information on the treatment of the several skin diseases, the reader is referred to works written expressly on that subject. As it is one which can scarcely be understood without the aid of plates, minute detail would be of little use in this place, even if the limits of this work allowed of it. (Consult the works of Wilson, and Burgess, and the illustrated atlas of Nelligan.)

CHAPTER IX.

PARASITIC ANIMALS.

1. Intestinal Worms.
2. Filaria Medinensis, or Guinea Worm.
3. Other Parasitic Animals.

INTESTINAL WORMS.

1. ASCARIS LUMBRICOIDES	Round Worm.
2. ASCARIS VERMICULARIS	Thread Worm.
3. TÆNIA	Tape Worm.

ASCARIS LUMBRICOIDES—ROUND WORM.

SYNONYM.—Lumbricus or Lumbrici.

SYMPTOMS.—These vary with the part of the alimentary canal occupied by the worm, and with the number of the worms, which is generally considerable, though there is sometimes only one worm. The symptoms commonly present are an uneasy sensation in the abdomen, sometimes amounting to actual pain, which is often described as a biting or gnawing pain; hardness and swelling of the belly; an irregular state of bowels, with scanty evacuations of mucus, sometimes tinged with blood; tenesmus, and, in some cases, dysuria; a variable and sometimes excessive appetite; fœtid breath, and furred tongue. There is also a sensation of itching at the nose and anus, which leads the patient to scratch and pick those parts. The patient also grinds his teeth in his sleep. Increased flow of saliva and bleeding from the nostrils are among the occasional symptoms. The constitutional symptoms are those of infantile remittent fever (see p. 359), with a more marked degree of nervous affection. In young children convulsions are often traceable to this cause. It has also given rise to chorea, headache, giddiness, and disordered vision; to dry cough and spasmodic asthma; to violent palpitations, and severe hysterical symptoms. In some instances the general health does not suffer in any appreciable degree.

DIAGNOSIS.—There is no certain sign of the presence of these worms in the intestinal canal. Their presence in the canal is first

revealed when they are discovered in the motions, either with or without the operation of medicines. In some cases they have been discharged from the stomach by vomiting, and have occasionally been found in abscesses communicating with the intestines. Their common habitat is the small intestines. They vary from half a foot to a foot in length. The annexed woodcut shows this worm of a common size and proportion with the head, *a*, magnified about fourfold. (From a specimen in the Museum of King's College.)



PROGNOSIS.—These worms when once proved to exist may generally be removed by appropriate remedies.

CAUSES. — *Predisposing.* Childhood and youth. A cachectic state of constitution; undigested food in the alimentary canal; unripe fruit and vegetables; bad water.

Exciting.—It is probable that the ova are introduced into the alimentary canal with the food or drink.

TREATMENT. — *Indications.* I. To cause the expulsion of the worms. II. To improve the general health and the functions of the alimentary canal, so as to guard against their recurrence.

1. The first indication is fulfilled. (*a*) By the use of brisk aperient medicines. (*b*) By the use of anthelmintics. (*c*) By anthelmintics followed by brisk aperients. (*d*) By aperient or anthelmintic injections.

(*a*) The best aperient medicines are calomel, jalap, scammony, colocynth, and aloes. A good combination for children consists of calomel and jalap in equal quantities, and in doses proportioned to the age; and for adults five grains of calomel with five grains of extract of colocynth. The powder or pills should be taken on an empty stomach, and should be followed within two or three hours by a full dose of castor-oil. Should these aperients fail, a table-spoonful of oil of turpentine may be substituted for the first aperient, followed as before by a full dose of castor-oil.

(*b*) *Anthelmintics* are of two classes, those which act mechanically, and those which act by poisoning the worm. To the first class belong cowhage, and the coarse powders of metallic tin, iron, or zinc, with metallic mercury; to the second class belong the root of the spigelia marylandica, of the male fern, or of the kosso; the bark of the pomegranate, and the rind of the walnut; the entire class of bitters, such as wormwood, rue, tansy, garlic, savin, chenopodium, and santonica, and their essential oils and ethereal extracts; also assafœtida, camphor, turpentine, copaiba, and common salt.

(*c*) The anthelmintic selected for use should be given on an empty stomach, and should be followed, in two or three hours, by a full dose of castor-oil (an ounce for the adult), as recommended above with turpentine and castor-oil.

(*d*) A strong solution of common salt in weak gruel is a suitable enema, as is also oil of turpentine in the proportion of one ounce to the pint, when there is reason to believe that the worms occupy the large intestines. It has been proposed to destroy the worm by injections of infusion of tobacco, or of tobacco smoke; also by shocks of electricity sent through the abdomen.

II. The second indication is fulfilled by all means tending to improve the general health, by due regulation of the diet, and by keeping the bowels in an open state. Dyspeptic symptoms must be treated according to the rules laid down under Dyspepsia (see p. 523). Excess in eating must be avoided, and unripe fruits and raw vegetables should be forbidden.

ASCARIS VERMICULARIS—THREAD-WORM.

SYNONYMS.—Ascarides. Maw-worm.

SYMPTOMS.—As this worm chiefly infests the large intestines, and especially the rectum, and in considerable numbers, there is an unusual amount of irritation at the verge of the anus. In consequence of the small size of the worms, they are not only contained in the evacuations, but crawl out of the rectum, so as to be found in the clothes or in the bed of the patient, and in females they find their way into

the vagina, and cause irritation there. In adult males, they are among the causes of spermatorrhœa. The constitutional symptoms are those described above. (See Ascaris Lumbricoides.)

Fig. 1. Fig. 2.





DIAGNOSIS.—The only certain proof of the existence of these worms is the discovery of them in the evacuations or on the person of the patient. The worms are shown of their usual size in Fig. 1, and greatly magnified in Fig. 2.

PROGNOSIS. — These worms are easily expelled by remedies; but in consequence of their large number and rapid production, it is not easy to insure their complete expulsion. They are also very liable to recur.

TREATMENT.—As the usual seat of these worms is the rectum, injections are more strongly indicated than in the case of other intestinal worms. They are, however, discharged in considerable numbers by the use of aperients. The treatment, therefore, consists in a combination of brisk aperient medicines, with purgative enemata, should the medicines alone prove insufficient. In children, a combination of equal parts of calomel and jalap, in a dose proportioned to the age, and in adults five grains of calomel and five grains of colocynth, followed in either case by a full dose of castor-oil, is a suitable form of aperient. The best enemata consist of a strong solution of common salt, (one or two ounces to the pint,) or an ounce of oil of turpentine in weak gruel, or a pint of any of the bitter infusions.

Fig. 1.



There is another species of thread-worm commonly found in the cæcum and colon, and known as the TRICHOCEPHALUS DISPAR, TRICHURIS, or LONG THREAD-WORM. It is distinguished from the common thread-worm by its greater length, and by the extreme tenuity of the anterior two-thirds, and the increased size of the posterior third of the body. Also, in the case of the male, by the

peculiar form of the spiculum and sheath, shown greatly magnified at *b* (Fig. 2). The posterior part of the body is commonly found coiled up as in Fig. 1, which shows the worm of its natural size. (From Dr. Hooper's collection in King's College Museum.)

Fig. 2.



The treatment is that of the common thread-worm; but injections are less necessary.

TÆNIA—TAPE-WORM.

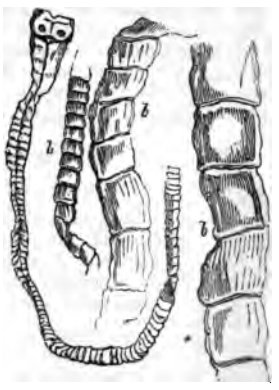
SPECIES.—1. Tænia solium: or common tape-worm. 2. Tænia lata: or broad tape-worm.

1.—TÆNIA SOLIUM.—COMMON TAPE-WORM.

SYNONYM.—Long tape-worm.

SYMPTOMS.—Those already described (see Ascaris Lumbricoides). The tape-worm occupies the whole track of the intestines, but chiefly the ileum. Joints of the worm frequently pass from the bowels, even without medicine, or they escape as the patient moves about.

DIAGNOSIS.—There are no symptoms by which the tape-worm can be distinguished from other intestinal worms. Its appearance is quite characteristic, and the joints, when expelled from the bowels, may be readily recognised. The worms vary in length from four to twenty feet, and sometimes occupy the whole length of the intestinal canal. The annexed engraving shows three segments of the worm (*b b b*) of their usual size; and the head and upper extremity magnified by a common lens. The head is from a preparation by Dr. Lionel Beale. Two of the osculæ are distinctly seen, the other two are only indicated by slight depressions upon the upper margin.



PROGNOSIS.—It is easy to remove considerable portions of the worm by proper remedies. The entire worm is less frequently expelled. Search should always be made for the head. Until this is expelled, the patient is not effectually relieved; but when any number of the small joints at the upper end of the worm are expelled, there is a probability in favour of the head having also been removed.

CAUSES.—Obscure. The cysticercus constituting the 'measles' in pork?

TREATMENT.—That of the ascaris lumbricoides (p. 632). The following are the best remedies:—

(*a.*) Oil of turpentine, in the dose of half an ounce, followed in two hours by an ounce of castor-oil. This treatment rarely fails of removing the tape-worm, but it is open to the objection that the turpentine acts as a stimulant to the brain and urinary organs, sometimes producing painful strangury. It is much less apt, however, to produce this effect if speedily followed by the castor-oil.

(*b.*) The root of an Abyssinian plant called the kosso, in the form of infusion (ʒvi. to Oss. of water), taken at a single dose. This is an extremely effective remedy.

(*c.*) The essential oil of the male fern in the dose of ʒi. or ʒiss. It may be given in capsules.

(*d.*) The ethereal extract of the root of the male Shield-Fern (Lastræa Filix Mas), first proposed by M. Peschier, and since revived and strongly recommended by Dr. Christison. It would seem to be the most uniformly successful remedy yet employed. (See the Monthly Journal of Medical Science, July 1853.) The dose is from 18 to 24 grains, and no laxative medicine is required.

The Kameela or Rottlera Tinctoria in the dose of ʒi. in water; or ʒi. ʒii. or ʒiii. of the tincture (ʒiv. of the powder to Oi. of alcohol). Dr. C. A. Gordon and Dr. Thomas Anderson.

For other anthelmintics, see Ascaris Lumbricoides, p. 633.

These remedies should be given on an empty stomach. A good way of administering them is to order an ounce of castor-oil to be taken over night, the anthelmintic in the morning, and a second ounce of castor-oil two hours afterwards. No food to be taken while the medicines are being administered.



2.—TÆNIA LATA, OR BROAD TAPE-WORM.

SYNONYM.—Bothriocephalus latus.

SYMPTOMS.—Those of the ascaris lumbricoides (p. 631). The bothriocephalus latus is very rare in England. It is common in Switzerland and Russia, and occurs in France, in common with the tænia solium, which latter is the species found in England.

DIAGNOSIS.—From the common tape-worm by the peculiar shape of the head, which is marked in the direction of its length by two fossæ, and by the shape of the sections, which are much broader than they are long. The head and some of the upper segments are shown in the subjoined engraving, from a specimen in the Museum of King's College.

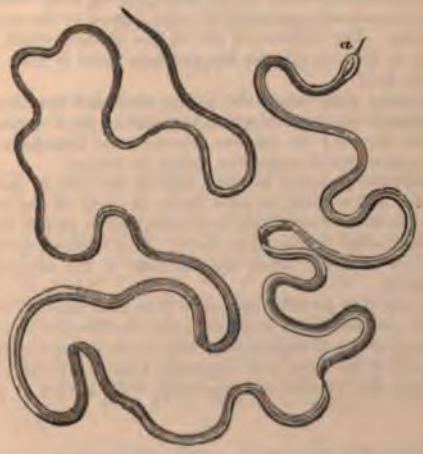
TREATMENT.—That of the common tape-worm.

FILARIA MEDINENSIS—GUINEA-WORM.

SYNONYMS.—Dracunculus. Hair-worm.

SYMPTOMS.—An itching sensation is felt in the skin of some part of the upper or lower extremities; most frequently in the lower extremities, and especially in the feet. This is soon followed by the appearance of a small vesicle, succeeded by an indolent inflamed swelling like a boil, which breaks and discharges its contents. The head of the worm gradually protrudes through the opening, so that it may easily be seized. Much skill and care are required to withdraw the worm without breaking it; and unsuccessful attempts are apt to be followed by acute inflammation, extensive suppuration, and, in some cases, mortification.

DIAGNOSIS.—The length of the worm varies from half a foot to twelve feet. Its form and size are shown in a subjoined engraving of



a worm extracted from the heel of a negro, and preserved in the Museum at King's College. The form of the tail is seen at *a*. The head is of a darker colour than the body.

CAUSES.—*Predisposing.* The tropical regions of Asia, Africa, and especially Upper Egypt, Nubia, and Guinea. *Exciting.*—The worm in an embryo state is supposed to pierce an exposed portion of the skin.

TREATMENT.—The worm requires to be very cautiously and patiently extracted, by being wound upon a small quill, or roll of cotton. Suppuration should be promoted by the common bread-poultice.

PROPHYLAXIS.—When the disease prevails among bodies of men, separation of the sick from the sound, and scrupulous cleanliness.

OTHER PARASITIC ANIMALS.

In addition to the species described in the preceding pages, there are several varieties of parasitic animals, or entozoa, of which some are to be found in all, or in most, of the principal textures and organs of the body, while others infest particular organs or textures only.

To the first class belong the two species of hydatids, the Acephalocystis, and the Echinococcus, which consist in common of a globular laminated sac, enclosing a transparent liquid. They are both nourished by imbibition, occupy for the most part the solid viscera of the body, and are generally contained in a cyst formed by the surrounding cellular tissue. The cysticercus, one of the entozoa, which is somewhat allied to the true hydatid, has also been found in more than one organ of the body.

To the second class belong the *Filaria oculi*, and the *Filaria bronchialis*, named from the parts which they infest: the *Trichina spiralis*, found in the muscles; the *Distoma hepaticum*, or liver-fluke; and the *Strongylus gigas*, which makes the kidney its habitat.

The *symptoms* produced by these entozoa are due, in part, to the enlargement they occasion, in part (as in the case of the strongylus gigas), to the destruction which they cause, and in part to the inflammation which often follows their death. The trichina spiralis, however, does not appear to affect the functions of the muscles, or the general health.

The *treatment* of parasitic animals will be determined by the symptoms which they occasion. No precise rules can therefore be laid down. It has been proposed to employ electricity for the purpose of destroying entozoa; and it has been also suggested that we should administer camphor and the volatile oils internally, with a view of poisoning them.

CHAPTER X.

POISONS.

THE subject of Poisons is here treated simply as a branch of the Practice of Medicine. For the tests of the several poisons, and the more minute details respecting them, the reader is referred to works on Toxicology, or Forensic Medicine. The antidotes for the principal poisons will be found appended to the Formulæ.

1. Irritant Poisons.
2. Narcotic Poisons.
3. Narcotico-Irritant Poisons.

1. IRRITANT POISONS.

DEFINITION.—Poisons which cause inflammation or irritation in the alimentary canal, with or without specific remote effects on other organs of the body.

SYMPTOMS.—After an interval varying from a few seconds to half an hour or more from the swallowing of the poison, vomiting and purging, with pain in the stomach and bowels, increased by pressure; and accompanied by inflammatory fever, or extreme prostration of strength. Pain and constriction of the mouth, throat, and gullet, accompanying or following the act of swallowing; intense thirst; hoarse voice, wheezing respiration, and cough; discharge of blood from the stomach and bowels; tenesmus; strangury, dysuria, or suppression of urine; convulsions and epileptic seizures; and cutaneous eruptions, are symptoms of more or less frequent occurrence, but not present in every instance. The remote constitutional effects, whether common to other severe injuries, or specific, are also subject to great variety.

MORBID APPEARANCES.—Marks of corrosion, inflammation, suppuration or gangrene in the stomach and upper part of the alimentary canal, extending, in certain cases, to the gullet, throat, and mouth, and through the whole length of the intestines. Perforation of one or other of these parts. In certain cases, signs of inflammation in the windpipe and lungs; in the peritoneum and pleura; in the rectum and bladder. In certain other cases, peculiar stains or indications of the action of the poison on the mouth, throat, gullet, stomach, and duodenum.

DIAGNOSIS.—*During life*, from English and Asiatic cholera, in many cases of irritant poisoning, by the blood mixed with the evacuations from the stomach and bowels, and in many other cases by the effect of the poison upon the mouth, throat, and gullet. In other instances, again, by the specific remote effects of the poison. (*E.g.* inflamed eyes, gastritis, and rapid pulse, in poisoning by arsenic; salivation in poisoning by the preparations of mercury; jaundice, in poisoning by the preparations of copper; pneumonia, in poisoning by tartar emetic; inflammation of the urinary organs, in poisoning by cantharides; &c.) *After death*, by the traces of acute inflammation, and its consequences in the several portions of the alimentary canal; and in many cases by appearances in the upper part of the canal appropriate to particular irritant poisons.

PROGNOSIS.—Dependent on the nature of the poison, the degree of concentration, the vehicle, the dose, the prompt administration or otherwise of an antidote, the state of the stomach (whether full or empty) when the poison was swallowed, and the age and strength of the patient.

MORTALITY.—The mortality varies, in the case of the several poisons contained in this class, from a large proportion of the cases down to a rarely fatal result.

TREATMENT.—After the administration of an antidote (if any exist), the prompt and complete evacuation of the stomach by the stomach-pump (except in the case of the strong corrosive poisons), or by emetics of common salt, mustard, ipecacuanha, or sulphate of zinc, assisted by large draughts of warm water, and tickling the throat with a feather or with the finger. After the evacuation of the stomach, the free use of milk, gruel, barley-water, and abstinence from all solid food. When inflammation runs high, ice or iced-water; when great tenderness is present, leeches followed by warm fomentations. When the bowels cease to discharge blood, and the patient suffers from tenesmus or constipation, one or two table-spoonfuls of castor-oil, with twenty drops or half a drachm of laudanum, mixed with a small quantity of hot milk. Extreme prostration will require the use of larger doses of laudanum, with wine or brandy. When fever runs high, it may be necessary to draw blood from the arm. Occasional symptoms, and symptoms peculiar to certain poisons only, must be treated in the same manner as the same symptoms due to other causes.

2.—NARCOTIC POISONS.

DEFINITION.—Poisons which act on the brain and spinal marrow, and give rise to symptoms referable to those organs, without exciting any irritation or inflammation of the alimentary canal.

SYMPTOMS.—After an interval, varying from a few seconds to one or two hours from the swallowing of the poison, the patient is seized with giddiness, headache, dimness of vision, singing in the ears, drowsiness passing into stupor, and ending in complete coma, with palsy, convulsions, epileptic fits, or tetanic spasms.

MORBID APPEARANCES.—Often very slight. The brain sometimes healthy; the veins and sinuses sometimes gorged with blood; with serum in the ventricles and at the base. In rare instances extravasation of blood.

DIAGNOSIS.—From the close resemblance of the symptoms of some forms of narcotic poisoning and apoplexy, no satisfactory diagnostic marks can be laid down for narcotic poisons as a class; and in any case the history of the first appearance and progress of the symptoms will constitute our principal means of distinction.

PROGNOSIS.—This, too, cannot be laid down for the entire class, as the chances of recovery vary very greatly with the particular poison which has been taken.

TREATMENT.—The prompt use of the stomach-pump, and, until that can be procured, the administration of emetics of common salt, mustard, ipecacuanha, or sulphate of zinc. The cold affusion as a shock, especially in the early stage of the poisoning. The patient to be kept awake by walking him up and down, or by flecking his hands and feet with a wet towel. After the complete evacuation of the stomach, strong coffee and tea, and diffusible stimulants, to be freely administered. The bowels to be relieved by full doses of castor-oil. So long as the surface continues cold and livid, the heat to be restored by assiduous frictions, and by warm bottles to the feet and pit of the stomach, or by the hot-air bath. In extreme cases, artificial respiration, and galvanic shocks passed from the spine of the neck to the pit of the stomach. This is the treatment of cases of poisoning by opium. In poisoning by prussic acid, the cold affusion is the first remedy to be employed; and in cases which survive some minutes or hours, heat and assiduous frictions, to restore warmth to the surface, must take the place of the compulsory exercise necessary in poisoning by opium, and by other poisons producing well-marked narcotic effects.

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3. NARCOTICO-IRRITANT POISONS.

SYNONYM.—Narcotico-acrids.

DEFINITION.—Poisons which produce the combined effects of the irritant and narcotic poisons; the irritant action being generally less violent than in the case of the pure irritants, and delirium being of more common occurrence than in cases of poisoning by the pure narcotics.

SYMPTOMS.—At an interval varying from about an hour to three or four hours after swallowing the poison (which, in many cases, has a peculiar taste), giddiness, disorders of the senses of sight and hearing, delirium, convulsions, tetanic spasms, stupor passing into coma; preceded or accompanied by vomiting and purging, with pain and tenderness of the abdomen. As a general rule the narcotico-irritants act chiefly or wholly as narcotics in very large doses, and mainly as irritants in small doses.

MORBID APPEARANCES.—Not strongly marked or uniform, consisting of marks of inflammation in the stomach and intestines, with congestion of the brain.

DIAGNOSIS.—From most of the pure irritants by the presence of symptoms of narcotic poisoning. From the pure narcotics by the presence of more or less irritation in the alimentary canal; also in many cases (especially in poisoning by stramonium, belladonna, and hyoscyamus) by the presence of delirium, and in other instances (poisoning by strychnia) by the violent tetanic spasms.

PROGNOSIS.—Dependent chiefly on the early or late commencement of the treatment, and on the circumstances mentioned under the head of Narcotics.

TREATMENT.—The prompt use of the stomach-pump, or of emetics, followed by aperients and enemata, if required. The rest of the treatment to be determined by the symptoms present; if chiefly those of irritant poisoning, the treatment proper to that class of poisons; if chiefly of narcotic poisoning, the treatment prescribed under Narcotic Poisons.

9. Spiritus ammoniæ fœtidus	Dose	f ʒ ss —f ʒii.
10. Ammoniæ hydrochloras	„	gr. x —ʒss.
11. Æther (sulphuricus)	„	♏ xx —f ʒi.
12. Spiritus ætheris compositus	„	f ʒ ss —f ʒii.
13. Spiritus ætheris nitrici	„	f ʒ i —f ʒss.
14. Spiritus rectificatus; tenuior; and vini Gallici. Mistura spiritus vini Gallici		
15. Oleum anethi, anthemidis, anisi, cajuputi, carui, caryophylli, cinnamomi, fœniculi, juniperi, lavandulæ, limonum, menthæ, (viridis et piperitæ), myristicæ, pimentæ, pulegii, rutæ, sabinæ, sassafras	„	♏ iii —♏ v.
16. Spiritus anisi, armoraciæ compositus, carui, cinnamomi, juniperi compositus, menthæ (viridis et piperitæ), myristicæ, pimentæ, pulegii, and rosmarini	„	f ʒ i —f ʒ ss.
17. Tinctura aurantii, calumbæ, capsici, cardamomi composita, cascarillæ, castorei, cinchonæ, cinchonæ composita, cinnamomi, cinnamomi composita, gentianæ composita, guaiaci composita, hellebori, lavandulæ composita, limonum, lupuli, myrrhæ, quinæ composita, serpentariæ, valerianæ, valerianæ composita, and zingiberis	„	f ʒ ss —f ʒii
18. Camphor	„	gr. v —gr. x.
19. Tinctura camphoræ composita	„	♏ x —f ʒi.
20. Mistura camphoræ	„	f ʒ i —f ʒii
21. Spiritus camphoræ	„	♏ x —f ʒss.
22. Moschus	„	gr. v —ʒi.
23. Mistura moschi	„	f ʒ i —f ʒii.
24. Assafœtida	„	gr. v —ʒi.
25. Tinctura asafœtidæ	„	f ʒ i —f ʒii
26. Oleum terebinthinæ	„	f ʒ i —f ʒss.
27. Creasotum	„	♏ i —♏ii.
28. Phosphorus	„	gr. ¼ —gr. i.
29. Potassæ chloras	„	gr. x —ʒi.
30. Liquor sodæ chlorinatæ	„	f ʒ i —f ʒss.
31. Liquor calcis chlorinatæ	„	f ʒ i —f ʒss.

The mistura camphoræ, the distilled waters (aqua anethi, carui, cinnamomi, pulegii, pimentæ, menthæ,—viridis and piperitæ—), and the tonic infusions (infusum anthemidis, armoraciæ compositum, aurantii compositum, calumbæ, caryophylli, cascarillæ, cinchonæ, cusphariæ, diosmæ, gentianæ compositum, krameriæ, lupuli, pareiræ, quassiæ, rosæ compositum, serpentariæ, and simarubæ) are appropriate vehicles for the stronger stimulants, and the tonic syrups (especially the syrupus aurantii and zingiberis) may be used to impart an agreeable flavour.

Stimulants in the form of Mixture and Draught.

1. ℞. Ammoniæ sesquicarb. ʒss.
Liq. ammoniæ acetatis f ℥iii.
Syrupi aurantii f ℥i.
Aquæ f ℥ii. M. (⅛.)

2. ℞. Tinct. ammoniæ C. f ʒii.
Mist. camphoræ f ℥v.
Syrupi zingib. f ʒvi. M. (¼.)

3. ℞. Spirit. ammon. aromat. f℥ss.
Tinct. lavandulæ C. f ℥i.
Aquæ cinnamomi f ℥iiiss.
Syrupi aurantii f ℥i. M. (¼.)

4. ℞. Liq. amm. sesquicarb. f ℥ss.
Tinct. guaiaci ammon. f ℥ss.
Decocti cinchonæ f ℥v. M.
(⅛—in chronic rheumatism.)

5. ℞. Guaiaci pulv. ℥i.
Tinct. guaiaci ammon. f ℥ss.
Pulv. acaciæ ʒii.
Syrupi croci f ℥ss.
Aquæ pulegii f ℥v. M.
(¼—in chronic rheumatism.)

6. ℞. Ætheris (sulphurici) f ℥ss.
Mist. camphoræ f ℥vss. (¼.)

7. ℞. Spirit. ætheris C.
Tinct. lavand. C. āā f ℥ss.
Infus. aurantii C. f ℥v. (¼.)

8. ℞. Spirit. ætheris C. f ℥i.
Spirit. ammon. aromat. f ℥ss.
Spirit. cinnamomi f ℥ss.
Infus. cascarillæ f ℥iv. M.
(Dose, ⅛ or ¼.)

9. ℞. Ammoniæ sesquicarb. ℈ii.
Ætheris (sulphurici) f ℥ss.
Mist. camphoræ f ℥ivss.
Syrupi zingiberis f ℥i. M.
(Dose, ⅛ or ¼.)

10. ℞. Camphoræ ℈i.
Spirit. rectificat ♏v.
Reduce to a powder, and add—
Pulv. acaciæ ℥ss.
Syrupi limonum f ℥ss.
Aq. menthæ vir. f ℥vss. M.
(Dose, ⅛ or ¼.)

11. ℞. Camphoræ ℈i.
Mellis f ℥i.
Mix in a mortar, and add—
Spirit. ætheris C. f ℥ss.
Mist. moschi f ℥ivss. (⅛.)

12. ℞. Mist. moschi f ℥iv.
Spirit. æther, C.
Syrupi aurantii āā f ℥i. (¼.)

13. ℞. Spirit. ammon. fœtid. f ℥i.
Mist. assafœtidæ f ℥v. M.
(Dose, ½; in hysteria.)

14. ℞. Tr. valerianæ ammoniatæ.
Spt. ammon. fœtid. āā f ℥ss.
Spirit. armoraciæ C. f ℥ii.
Aquæ pimentæ f ℥iii. M.
(Dose, ¼; in the same.)

15. ℞. Tinct. valerianæ C. f ℥ss.
Spirit. juniperi C. f ℥ii.
Aquæ pimentæ f ℥iiiss. (¼.)

16. ℞. Infus. rosæ C. f. ℥iii.
Vini rubri Hispanici f ℥iiss.
Syrupi simplicis f ℥ss. M.
(Dose, ¼.)

17. ℞. Rad. armoraciæ excisæ ℥ii.
Seminis sinapis ℥ss.
Baccæ juniperi contus. ℥iii.
Vini albi Hispanici Oiii.
(Digest one week, and strain. Dose, a wine-glassful.)

18. ℞. Olei terebinth f ℥ss.
Mellis f ℥i.
Pulv. tragacanth ʒii.
Tinct. lavandulæ C. f ℥ss.
Aquæ f ℥iv. M. (¼.)

19. ℞. Olei terebinth f ℥ss.
Pulv. acaciæ ℥ss.
Spirit. juniperi C. f ℥ss.
Aquæ menthæ pip. f ℥v. (¼.)

20. ℞. Olei terebinth f ℥i.
Ovi vitellum unius.
Sacchari ℥ss.
Aquæ ℥iv. M. (¼.)
(18, 19, and 20 in chronic rheumatism.)

21. ℞. Creasoti ♏vi.
Pulv. tragacanth ℥ss.
Mist. camphoræ f ℥vi. M.
(Dose, ⅙ or ¼ in obstinate vomiting without organic disease, and in sea-sickness. Also in acne rosacea.)

22. ℞. Potassæ chloratis ʒi.
Syrupi rhœados f ℥i.
Aquæ destillatæ f ℥v. M.
(Dose, ½. In febrile affections and the febrile exanthemata.)

23. ℞. Spirit. ætheris nitrici f ℥ii.
Syrupi tolutani f ℥iv.
Pulv. acaciæ ℥ss.
(A Linctus in teasing coughs. Dose, a tea-spoonful.)

24. ℞. Phosphorus gr. iv.
Olei olivæ f ℥ss.
Digest a fortnight in the dark, and add—
Olei carui ♏iv.
(Dose, 15 drops cautiously increased, in almond emulsion. In the same diseases as F. 28.)

Stimulants in the form of Pill or Powder.

25. ℞. Camphoræ.
Moschi āā ℥ss.
Ol. cajuputi ♏v. vel. q. s.
(Divide into twelve pills: two every two or three hours.)

26. ℞. Creasoti ♏x.
Pulv. glycirrhizæ ʒi. M.
(Divide into twelve pills; one three times a-day; in neuralgia, chronic rheumatism, and bronchitis.)

27. ℞. Camphoræ.
Moschi āā gr. x. M.
(The powder to be taken in barley-water; in hysteria.)

28. ℞. Phosphorus gr. iii.
Ol. caryophylli ♏xii.
Pulv. glycirrhizæ q. s. M.
(Divide into twelve pills; one twice or three times a-day. In lupus, obstinate scaly diseases, and syphilitic tubercles.)

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2. STIMULANTS ACTING LOCALLY UPON CERTAIN SYSTEMS OR PARTS.

On the Muscular System (in Paralysis).

Preparations of the London Pharmacopœia.

1. Extractum nucis vomicæ – dose gr. ½, gradually increased to gr. iii.
2. Pulvis nucis vomicæ – – „ gr. v, gradually increased to ℈i.
3. Strychnia – – – – – – – „ gr. $\frac{1}{16}$, cautiously increased to gr. i.

In the form of Mixture or Draught.

29. ℞. Pulv. nucis vomicæ ʒss.
Mist. acaciæ f ℥ii.
Tinct. cardam. comp. f. ℥i.
Aquæ destillatæ f ℥iii. (½.)

30. ℞. Strychniæ gr. i.
Sacchari alb. ʒii.
Aceti f ʒi.
Aquæ destill. f ℥viii. M.
(Dose, a table-spoonful, or ⅛.)

31. ℞. Strychniæ gr. ii.
Spirit. rectif. f ℥i.
(Dose, ♏10 cautiously increased.)

32. ℞. Strychniæ gr. i.
Spirit. rectif. f ℥ss.
Spt. ætheris nitrici f ℥iss.
Syrupi rhæados f ℥i.
Aquæ ℥v. M.
(Dose, a table-spoonful.)

In the form of Pill.

33. ℞. Pulv. nucis vomicæ.
Confect. rosæ āā ʒss. M.
(Divide into twelve pills, one to be taken three times a-day.)

34. ℞. Strychniæ gr. i.
Quinæ disulphat. ʒss,
Confect. rosæ ʒi. M.
(Twenty pills, one pill for a dose.)

On the Uterus.

Preparations of the London Pharmacopœia.

1. Ergota or secale cornutum; dose ℈i—ʒss.
2. Tinctura ergotæ ætherea; dose f ʒss—f ʒii.

35. ℞. Ergotæ ʒii.
Aquæ bullient. f ℥vi.
(½ every 20 minutes for three or four successive doses.)

36. ℞. Ergotæ ℥ss.
Spirit. vini rectif. f ℥iss.
(A tea-spoonful every half-hour, till it takes effect.)

On the Urinary Organs.

Preparations of the London Pharmacopœia.

Cantharis vesicatoria. Dose in powder gr. ½, cautiously increased.
Tinctura cantharidis. Dose ♏x, cautiously increased.

In the form of Mixture or Draught.

37. ℞. Tinct. cantharidis f ʒi.
Infus. quassiæ f ℥vi. M.
(½ three times a-day. In incontinence of urine from debility of the bladder, and in obstinate gleet.)

38. ℞. Tinct. cantharidis f ʒi.
Tinct. ferri sesquichl. f ʒii.
Aquæ pimentæ f ℥vi. M.
(A table-spoonful three times a-day, in anæmic children subject to incontinence of urine.)

In the form of Pill.

39. ℞. Pulv. cantharidis gr. ii.
Spirit. vini rectif. ♏iii.
Camphoræ.
Ext. hyoscyami āā gr. x.
(Mix the camphor with the spirit first; divide into four pills, and give one twice a-day.)

40. ℞. Pulv. cantharidis gr. vi.
Ferri sulphat. exsicc.
Ext. gentianæ āā ℈i.
(Divide into twelve pills, of which one to be taken three times a-day; in incontinence of urine occurring in anæmic adults.)

On the Mucous Membranes.

Preparations of the London Pharmacopœia.

Copaiba - - - - - - - - - - -	Dose ♏xx to ʒi or more.
Pulvis cubebæ - - - - - - - -	„ ℈i to ʒii or more.
Tinctura cubebæ - - - - - - -	„ f ʒi to f ʒii or more.
Confectio piperis (nigri) - - - -	„ ʒi to ʒii.
Balsamum tolutanum - - - - -	„ ʒss to ʒi.
Syrupus balsami tolutani - - -	„ f ʒii to f ʒss or more.
Tinctura benzoini composita - -	„ f ʒss to f ʒii.
Oleum terebinthinæ purificatum -	„ ♏x to ʒss.

In the form of Mixture, Draught, &c.

41. ℞. Copaibæ f ℥ss.
Liq. potassæ f ʒi.
Syrupi tolutani f ℥ss.
Decoct. hordei C. f ℥v. (½.)
(In gonorrhœa; also in bronchitis.)

42. ℞. Pulv. cubebæ ʒii.
Syrupi papaveris f ʒi.
Pulv. acaciæ ℥ss.
Aquæ cinnamomi f ℥vii.
M. (Dose, a table-spoonful; in gonorrhœa and gleet.)

43. ℞. Pulv. cubebæ ℥ss.
Confect. sennæ ʒii.
Syrupi simp. q. s. M.
(To be taken at the onset of an attack of gonorrhœa, which, if retained on the stomach, it sometimes cuts short.)

44. ℞. Confectionis piperis.
——— cassiæ āā ℈.
M.
(A dessert or table-spoonful twice or thrice a-day; for hæmorrhoids.)

45. ℞. Tinct. Benzoini C. f ℥ss.
Syrupi tolutani f ʒii.
Pulv. tragacanth ʒii.
Aquæ f ʒiiiss. M.
(Dose, ½; in bronchitis.)

46. ℞. Olei terebinth. pur. ʒii.
Mellis ℥iv.
Pulv. glycirrh. q. s. M.
(A table-spoonful three or four times a-day; in chronic bronchitis.)

In the form of Pill or Powder.

47. ℞. Copaibæ.
Magnesiæ āā ʒss. M.
(Divide into 100 pills, of which give six four times a-day; in gonorrhœa and bronchitis.)

48. ℞. Pulv. cubebæ. ʒi.
Sodæ carb. ʒss. M.
(Divide into ten powders; one to be taken three or four times a-day; in gonorrhœa.)

(Copaiba may be administered in capsules enclosed in a thin layer of gelatine. Turpentine and iodine—a drachm of turpentine, or half a drachm of tincture of iodine to half a pint of hot water—may be inhaled as stimulants to the mucous membrane of the bronchial tubes.)

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3. EXTERNAL AND LOCAL STIMULANTS.

RUBEFACIENTS (Vesicants, Epispastics, Stimulating Embrocations, Plasters, Ointments, &c.).

Preparations of the London Pharmacopœia.

1. Acidum aceticum; hydrochloricum; nitricum; sulphuricum.
2. Alcohol; spiritus rectificatus.
3. Allium sativum.
4. Liquor ammoniæ; liquor ammoniæ fortior; linimentum ammoniæ; ammoniæ sesquicarbonas; liquor ammoniæ sesquicarbonatis; linimentum ammoniæ sesquicarbonatis.
5. Antimonii chloridum; antimonii potassio-tartras; unguentum antimonii potassio-tartratis.
6. Argenti nitras; liquor argenti nitratis; (ʒi.—ʒi.)
7. Armoraciæ radix.
8. Acidum arseniosum.
9. Barii chloridum.
10. Cajuputi oleum.
11. Calx chlorinata; linimentum calcis; potassa cum calce.
12. Camphora; tinctura camphoræ; linimentum camphoræ; linimentum camphoræ compositum.
13. Cantharis vesicatoria; tinctura cantharidis; acetum cantharidis; ceratum cantharidis; unguentum cantharidis; emplastrum cantharidis.
14. Capsicum; tinctura capsici.
15. Cerevisiæ fermentum; cataplasma fermenti.
16. Chlorine vapour.
17. Creasotum; unguentum creasoti.
18. Croton oil (tiglii oleum).
19. Cupri sulphas; cupri ammonio-sulphas; cupri diacetas impura (ærugo); linimentum æruginis.
20. Elemi; unguentum elemi.

21. Ceratum hydrargyri compositum; linimentum hydrargyri; emplastrum hydrargyri; emplastrum ammoniaci cum hydrargyro; hydrargyri nitrico-oxydum; unguentum hydrargyri nitrico-oxydi; hydrargyri iodidum; unguentum hydrargyri iodidi; hydrargyri biniodidum; unguentum hydrargyri biniodidi; hydrargyri bichloridum; hydrargyri ammonio-chloridum; unguentum hydrargyri ammonio-chloridi; hydrargyri bisulphuretum; unguentum hydrargyri nitratis; unguentum hydrargyri nitratis mitius; hydrargyri bicyanidum.
22. Iodinium; unguentum iodinii compositum; sulphuris iodidum; unguentum sulphuris iodidi.
23. Phosphorus.
24. Pix abietina; emplastrum picis; unguentum picis; unguentum picis liquidæ; resina; ceratum resinæ.
25. Potassæ hydras (potassa fusa); potassii bromidum; potassii sulphuretum; emplastrum potassii iodidi.
26. Pyrethri radix.
27. Unguentum sabinæ.
28. Sinapis; cataplasma sinapis.
29. Liquor sodæ chlorinatæ.
30. Linimentum saponis.
31. Staphisagriæ semina.
32. Succini oleum.
33. Sulphur sublimatum; unguentum sulphuris; unguentum sulphuris compositum.
34. Terebinthina vulgaris; terebinthinæ oleum; linimentum terebinthinæ.
35. Zinci chloridum; zinci sulphas; unguentum zinci.
36. The essential oils.
37. Emplastrum ammoniaci, cumini, ferri, galbani.

Stimulant Lotions.

49. ℞. Acidi nitrici.
Acidi hydrochlor. āā ♏xx.
Aquæ f ℥viii. M.
(Lichen and chronic eczema.)

50. ℞. Rosæ petalorum ℈i.
Aquæ ferventis f ℥viii.
Acidi nitrici diluti f ℥iiss. M.
(In the same.)

51. ℞. Creasoti ♏iv.
Mist. acaciæ f ℥i. M.
(In rheumatism.)

52. ℞. Acidi sulphurici dil.
Aquæ destillatæ āā f ℥ss.
(In Porrigo favosa.)

53. ℞. Potassæ fusæ ℈ii.
Aquæ destill. f ℥iv.
(In the same.)

54. ℞. Potassii sulphureti.
Saponis āā ℥ii.
Spt. rectif. f ℥i. M.
(In scabies and Porrigo favosa.)

55. ℞. Potassii sulphureti ℥iv.
Acidi sulphurici f ℥ss.
Aquæ Oii. M.
(In Scabies; Dupuytren's lotion.)

56. ℞. Liq. ammon. fort. f ℥i.
Spirit. rosmarini f ℥ss.
Tinct. camphoræ f ℥ii. M.
(A highly-stimulant application.)

Stimulant Baths.

57. ℞. Acidi hydrochlorici ʒii-ʒiv.
Aquæ q. s.
(In chronic diseases of the skin.)

58. ℞. Acidi nitro-mur.* ʒii-ʒiv.
Aquæ tepidæ (96°) q. s.
(In hepatic derangement. The mixed acid may be used in the proportion of ʒi to 8 gallons, as a bath or lotion.)

59. ℞. Sodæ carb. ʒiv—ʒviii.
Aquæ q. s.
(In chronic diseases of the skin.)

60. ℞. Potass. carb. ʒiv—ʒviii.
Aquæ tepid. q. s.
(The liquid may be sprinkled on bran, and applied to the skin in cutaneous diseases with low action.)

Stimulant Liniments.

61. ℞. Liq. ammoniæ f ʒ ss.
Liniment. saponis f ʒiss. M.

62. ℞. Tinct. cantharidis f ʒss.
Liniment. saponis f ʒiss.
(A good application to chilblains.)

63. ℞. Camphoræ ʒiss.
Olei terebinth. f ʒiss. M.

64. ℞. Tinct. cantharidis f ʒi.
Olei terebinth. f ʒss.
Lin. camphoræ f ʒss. M.

65. ℞. Pulv. sem. sinapis ʒi.
Acidi acetici f ʒss.
Lin. saponis c. f ʒiss. M.

66. ℞. Camphoræ ʒss.
Olei olivæ f ʒii. M.

67. ℞. Olei succini f ʒii.
Lin. saponis comp. f ʒx. M.
(Similar to Roche's royal embrocation. To be rubbed into the back in whooping-cough.)

68. ℞. Antim. pot. tart. ℈ii.
Aquæ rosæ f ʒii.
Tinct. cantharidis f ʒi. M.

69. ℞. Acidi sulphurici f ʒiss.
Olei terebinthinæ f ʒss.
Olei olivæ f ʒiss. M.
(Known as Pearson's liniment.)

70. ℞. Olei cajuputi f ʒiss.
Liq. ammon. sesquicarb. f ʒss. M.

Stimulant Ointments.

71. ℞. Argent. nit. gr. x.
Ung. cetacei ʒi. M.

72. ℞. Olei tiglii ♏x.
Adipis ʒss. M.

73. ℞. Creasoti ♏v—xxx.
Adipis ʒss. M.
(In acne, sycosis, lepra, psoriasis, ozœna, and ill-conditioned ulcers.)

74. ℞. Sodæ carb. ʒii.
Calcis ʒi.
Adipis ʒi. M.
(In Porrigo favosa.)

* One part nitric to two parts muriatic acid.

75. ℞. Potass. carb. ʒi.
Sulphur. precip. ʒii.
Adipis ʒiv. M.
(Helmerich's ointment in scabies.)

76. ℞. Picis liquidæ ʒiv.
Ceræ flavæ ʒss.
Sulphuris ʒi. M.
(In porrigo, impetigo, &c.)

77. ℞. Antim. pot. tart. ʒi
Adipis ʒi. M.
(In spinal irritation.)

78. ℞. Potassæ carb. ʒi.
Adipis ʒi. M.
(In pustular diseases of the skin.)

Stimulant Poultices.

79. ℞. Sinapis lb. ss.
Aceti calidi q. s. M.
(More stimulating than the cataplasma sinapis of the Ph. Lond.)

80. ℞. Lini seminis contriti ʒiv.
Aquæ ferventis f ʒviii.
Mix gradually, and add—
Calcis chlorinatæ ʒii.

Stimulant Gargles.

81. ℞. Tinct. capsici f ʒss—f ʒi.
Syrupi simp. f ʒi.
Aquæ rosæ f ʒvi. M.

82. ℞. Vini rubri Lusitan. f ʒvi.
Extracti cinchonæ ʒi.
Tinct. capsici f ʒss. M.

83. ℞. Acidi hydrochlorici f ʒss.
Mellis rosæ ʒi.
Aquæ hordei f ʒviss. M.

84. ℞. Acidi nit. f ʒi.
Acidi hydrochl. f ʒii.
Aquæ hordei f ʒviss.
Mellis rosæ f ʒi.
(In relaxed sore throat.)

85. ℞. Infus. rosæ c. f ʒiiiss.
Tinct. myrrhæ f ʒss.
Sacchari pur. ʒss. M.

86. ℞. Boracis ʒss.
Mellis rosæ ʒi.
Aquæ f ʒviss. M.

87. ℞. Mist. acaciæ ʒviiss.
Olei terebinth. ʒss. M.
(In ptyalism.)

88. ℞. Liq. sodæ chlorinatæ f ʒss.
Mellis ʒi.
Aquæ rosæ ʒiiss. M.
(A table-spoonful to be mixed with a wine-glass of warm brandy and water.)

Stimulant Enemata.

89. ℞. Liq. sodæ chlorinatæ f ʒss.
Decocti hordei f ʒx. M.

90. ℞. Olei terebinth. f ʒi.
Pulv. acaciæ q. s.
Mix and add—
Decocti hordei f ʒxix.
(In troublesome flatulence.)

91. ℞. Infusi fœniculi f ʒxiss.
Tinct. assafœtidæ f ʒss. M.

92. ℞. Olei terebinth.
Tinct. assafœtidæ ãã f ʒss.
Decocti hordei Oi. M.
(For the same purpose as F. 90, especially in hysteria.)

4. EXTERNAL STIMULANTS CONTAINING PREPARATIONS OF MERCURY, ARSENIC, IODINE, PHOSPHORUS, &c.

Ointments.

93. ℞. Camphoræ ℈i.
Unguenti hyd. fort. ʒss. M.

94. ℞. Hydrarg. chloridi ʒi.
Adipis ʒi. M.

95. ℞. Unguent. hydrarg. fort.
Cerati saponis āā ʒi.
Camphoræ ʒi. M.
(Known as Scott's ointment.)

96. ℞. Hydrargyri biniodidi gr. x.
Adipis ʒi. M.
(In syphilitic eruptions and inveterate scaly diseases.)

97. ℞. Hydrargyri iodidi ℈i.
Adipis ʒi. M.

98. ℞. Arsenici iodidi gr. iii.
Adipis ʒi. M.
(In cancerous diseases, lupus, &c.; must be used with great caution.)

99. ℞. Potassii iodidi ʒss.
Adipis ʒi. M.
(Scrofulous ulcers, papular diseases of the skin, and scabies.)

100. ℞. Sulphuris iodidi ℈i.
Adipis ʒss. M.
(In a variety of cutaneous diseases.)

101. ℞. Ung. iodinii c. ʒss.
Adipis ʒv. M.

102. ℞. Zinci iodidi ʒi.
Adipis ʒi. M.

103. ℞. Barii iodidi gr. iv.
Adipis ʒi. M.
(In scrofulous tumours; must be used with caution.)

104. ℞. Phosphorus gr. ii.—v.
Ætheris q. s.
Dissolve, then add—
Camphoræ ℈i.
Cerati albi ʒss. M.
(Lupus, syphilitic tubercle, acne rosacea.)

Liniments and Lotions.

105. ℞. Hyd. chloridi ʒi.
Mucil. acaciæ f ʒss.
Liq. calcis f ʒvss. M.
(The black wash.)

106. ℞. Hydrarg. bichloridi gr. x.
Liq. calcis f ʒvi. M.
(The yellow wash.)

107. ℞. Zinci sulphatis gr. i.
Spt. Rorismarini
Tr. Lavand. C. āā ♏xv.
Aquæ f ʒi. M.
(The red wash.)

108. ℞. Iodinii ʒss.—ʒi.
Potassii iodidi ℈ii.
Spt. vini rect. f ʒi. M.
(Iodine paint.)

Collyria.

109. ℞. Hydrarg. bichloridi gr. i.
Aquæ destill. f ℥viii. M.

110. ℞. Potassii iodidi gr. vi.
Iodinii gr. iii.
Aquæ destill. Oi. M.
(In scrofulous inflammation of the eye.)

Powders.

111. ℞. Acidi arseniosi gr. viii—x.
Hydrarg. chloridi ℈i. M.
(Dupuytren's powder in lupus.)

112. ℞. Acidi arseniosi gr. x.
Hydrarg. sulphuret ℈ii.
Carbonis animalis gr. x. M.
(Côme's powder in lupus.)

113. ℞. Hyd. chlorid. gr. cc.
Acidi arseniosi gr. i. M.
(In lupus, to be sprinkled over a small portion of diseased surface by means of a puff.—*Dupuytren.*)

Fumigations.

114. ℞. Sulphuris ℥ss—℥iss.
Iodinii ℈i—℈iii. M.
(A twelfth part of this powder to be used at a time. The vapours of sulphur and of iodine may also be used separately, in obstinate cutaneous diseases.)

115. ℞. Manganesii binoxidi ℈i.
Sodii chloridi ℥iii.
Mix, then add—
Acidi sulph. f ℥i.
Aquæ f ℥ii.
(Chlorine is given off from this mixture on applying heat.)

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5. NARCOTICS, ANODYNES, AND SEDATIVES.

(Including Antispasmodics belonging to these Classes.)

Preparations of the London Pharmacopœia.

1. Acidum hydrocyanicum dilutum, dose ♏iii—♏v, cautiously increased.
2. Aconiti (folia et radix), dose of leaves, gr. i—gr. ii. Aconiti extractum, dose gr. i—gr. ii. Aconiti tinctura, dose ♏iii—♏v. The doses to be cautiously increased. Aconitina (only used externally).
3. Amygdalæ amaræ oleum, dose ♏½—♏j.
4. Belladonnæ folia, dose gr. i. Extractum Belladonnæ, dose, gr. ½—gr. i. Tinctura Belladonnæ, dose ♏v—♏x. The doses to be cautiously increased.
5. Conii (folia et fructus), dose gr. iii—gr. v. Extractum Conii, dose gr. iii—gr. v. Tinctura Conii, dose f ℥ss—f ℥i. Pilulæ Conii compositæ, dose gr. v.

6. Digitalis (folia et semina), dose gr. i—gr. iii. Infusum Digitalis, dose f ℥ss—f ℥i. Tinctura Digitalis, dose ♏x increased to ♏xx. Extractum Digitalis, dose gr. ½—gr. i.
7. Hyoscyami (folia et semina) dose gr. v—gr. x. Extractum Hyoscyami, dose gr. v—℈i. Tinctura Hyoscyami, dose ♏x—f ʒi.
8. Lactucæ extractum, dose gr. v—℈i.
9. Lobeliæ inflatæ pulvis, dose gr. i—gr. v. Tinctura Lobeliæ, dose ♏x—f ʒi. Tinctura Lobeliæ ætherea, dose ♏x—f ʒi.
10. Morphia, dose gr. ¼—gr. i. Morphiæ hydrochloras, dose gr. ¼—gr. ½. Liquor morphiæ hydrochloratis, dose ♏v—♏xx. Morphiæ acetas, dose gr. ⅓—gr. ½. Liquor morphiæ acetatis, dose ♏v—♏xx.
11. Opium, dose gr. i—gr. ii.
    Opii extractum, dose gr. ½—gr. iii.
    Pilulæ saponis C. (gr. i in gr. v), dose gr. v—gr. x.
    ——— styracis C. (gr. i in gr. v), dose gr. v—gr. x.
    Pulvis cretæ C. c. opio (gr. i in ℈ii), dose gr. x—℈ii.
    ——— kino C. (gr. i in ℈i), dose gr. x—℈i.
    ——— ipecacuanhæ C. (gr. i in gr. x), dose gr. x.
    Confectio opii (gr. i in gr. xxx), dose gr. x—ʒi.
    Tinctura opii (gr. i in ♏xiii), dose ♏ x—f ʒss.
    Vinum opii (gr. i in ♏xvi), dose ♏x—f ʒss.
    Tinctura camphoræ C. (less than gr. i in f ℥ss), dose f ʒss—f ℥ss.
    Liquor opii sedativus (two drops equal to three of laudanum).
    Black drop (one drop equal to three of laudanum).
    Enema opii (f ʒss of laudanum to starch f ℥iv).
12. Papaveris syrupus, dose, children f ʒi—f ʒii; infants ♏x—♏xx. Extractum Papaveris, dose gr. ii—gr. x.
13. Stramonii (folia et semina), dose gr. i—gr. v. Extractum Stramonii, dose gr. ½—gr. iii.
14. Tabaci enema (tobacco ℈i—boiling water Oss.)
15. Veratri vinum, dose ♏x. Veratria, dose gr. 1/12.

Cannabis indica, Indian hemp, dose of the extract, gr. ½—gr. ii, or more; dose of the tincture (extract ℥ss, *rectified* spirit f ℥x) ♏x—f ʒi, or more.

Æther and chloroform in vapour, dose ♏xx—ʒi.

Chloric æther, dose ♏x—xx.

Narcotics, &c., in the form of Mixture and Draught.

116. ℞. Tinct. opii ♏xx.
    Aquæ cinnamomi.
    Aquæ puræ āā f ʒvi. M.
    (To be taken at bedtime.)

117. ℞. Potassæ carb. ℈i.
    Aq. menthæ virid. f ℥i.
    Tinct. opii ♏xxv.
    Syrupi tolut. f ʒi. M.
    (To be taken at bedtime, with a table-spoonful of lemon-juice.)

118. ℞. Tinct. opii ♏xxx.
    Liq. ammon. acet.
    Aq. cinnamomi.
    Syrupi tolut. āā f ℥ss. M.
    (To be taken at bed-time.)

119. ℞. Morphiæ acetatis gr. i.
Aquæ destill. f ʒi. M.
(A tea-spoonful at bedtime, or on the return of pain.)

120. ℞. Acidi sulph. dil. ʒii.
Tr. opii f ʒss. or Tr. Hyoscy. f ʒii.
Tinct. digitalis f ʒi.
Infus. quassiæ ℥vi.
(Dose, ½, in states of system called "nervous.")

121. ℞. Acidi hydrocyan. dil. ♏xx.
Mist. amygdal. f ℥vi. M.
(Dose, ⅛ three times a-day.)

122. ℞. Bismuthi nitratis, gr. x.
Acidi hydrocyan. dil. ♏v.
Mist. acaciæ f ʒi.
Syrupi aurantii f ʒi.
M. fiat haustus. (In gastralgia.)

123. ℞. Acidi hydrocyan. dil. ♏xx.
Tinct. digitalis f ʒi.
Mist. camphoræ.
Aquæ cinnam. āā f ʒiii. M.
(A sixth part for a dose.)

124. ℞. Tinct. opii ♏iii.
Mist. acaciæ.
Syrup. simp. āā f ʒss.
Aquæ destil. f ʒi.
(To procure sleep in infants: dose, a tea-spoonful for a child of one month, repeated every half hour till sleep is procured. Each dose will contain about gr. $\frac{1}{12}$ of opium.)

125. ℞. Extract belladonnæ gr. ss.
Aquæ destill. f ʒi M.
(Dose ♏v—x three times a-day. A prophylactic in scarlatina.)

126. ℞. Mist. cretæ f ℥vi.
Conf. arom. ʒii.
Tinct. opii ♏xl.
Aquæ cinnam. f ℥ii. M.
(⅛ after each liquid motion.)

127. ℞. Potassæ nitratis ʒi.
Tinct. digitalis f ʒi.
Liq. ammon. acet. f ℥ss.
Aquæ destillatæ f ℥iii.
Syrupi croci f ℥ss. M. (½.)

128. ℞. Potassæ nitratis ʒi.
Syrupi papaveris f ʒi.
Mist. amygdalæ f ℥v. M.
(A dessert-spoonful when the cough is troublesome.)

129. ℞. Ætheris chlorici ♏x.
Pulv. tragacanth. Co. ʒi.
Syrupi tolutani f ʒii.
Aquæ f ʒvi. M.
(In troublesome coughs.)

Narcotics, &c., in the form of Pill.

130. ℞. Extracti opii gr. ½.
——— papav. gr. iv. M.

131. ℞. Ext. belladonnæ gr. iv.
Extracti conii.
Pulv. ipecac. c. āā ℈i. M.
(Divide into sixteen pills, one to be given every four or six hours. In pertussis and scarlatina.)

132. ℞. Pulv. digitalis.
—— scillæ.
Ext. hyoscyami āā ℈i. M.
Divide into twelve pills. (In bronchitis, asthma, &c.)

133. ℞. Camphoræ pulv. gr. iii.
Ext. hyoscyami gr. ii. M.
(To be taken at bed-time.)

134. ℞. Extracti hyoscy. gr. ii—v.
Extracti conii gr. iii. M.
(To be taken at bed-time.)

135. ℞. Extracti conii ʒss.
Pulv. fol. conii. ℈i. M.
(Divide into twelve pills; one four times a-day. In cancer and other painful affections where opium disagrees.)

136. ℞. Extract. conii.
Pulv. ipecac. comp. āā ℈i.
Mucil. acac. q. s. M.
(Divide into ten pills.)

137. ℞. Ext. stramonii gr. i.
Ext. glycirrh. ʒi. M.
(To be made into six pills. One to be taken occasionally as a lozenge when the cough is troublesome. In irritation of the larynx or throat.)

138. ℞. Ext. aconiti. gr. iii.
Ext. glycirrh. ℈i. M.
(Divide into six pills.)

Narcotics, &c., in the form of Powder.

139. ℞. Pulv. ipecac. comp. gr. i.
Sacchari. ℈i. M.
(Divide into four powders. For young infants. Each powder contains $\frac{1}{10}$ gr. of opium.)

140. ℞. Camphoræ gr. iii.
Spirit. vin. rect. ♏ii.
Pulv. ipecac. c. gr. v. M.
(A powder to be taken at bed-time.)

6. EXTERNAL SEDATIVE APPLICATIONS.

Preparations of the London Pharmacopœia.

1. Atropiæ sulphas.
2. Cataplasma conii; unguentum conii.
3. Chloroformyl.
4. Decoctum dulcamaræ, papaveris, veratri.
5. Emplastrum belladonnæ, opii.
6. Extractum aconiti, belladonnæ, conii, digitalis, hyoscyami, lactucæ, opii, papaveris, stramonii.
7. Linimentum opii.
8. Unguentum gallæ C., veratri, opii.

Several preparations of the Pharmacopœia enumerated among narcotics and sedatives at p. 654 also admit of external application. All substances, too, which produce cold by evaporation or otherwise, may be said to belong to the class of sedatives.

Sedative Lotions.

141. ℞. Liq. ammon. acet.
Spirit. tenuioris.
Aquæ, āā f ℥iv. M.

142. ℞. Liq. potassæ f ʒii.
Acid hydrocy. dil. f ℥iss.
Mist. amygdal. f ℥vii. M.
(A lotion in prurigo.)

143. ℞. Liq. plumbi diacetat. f ʒi.
Acidi acetici dil.
Spiritus rectif. āā f ℥ss.
Aquæ f ℥xi. M.

144. ℞. Ammon. hydrochloratis ℥i.
Spt. rectif. f ℥i.
Aquæ f ℥xv. M.

145. ℞. Potassii cyanidi gr. x.
Mist. amygdalæ f ℥vi. M.
(In chronic itching eruptions.)

146. ℞. Acidi hydrocyanici dil. Spiritus rectif. āā f ℥ss. Aquæ f ℥vii. M.
(In impetigo, and itching eruptions generally.)

147. ℞. Acidi hydrocyanici dil. Spiritus rectif. āā f ℥s Plumbi diacetatis ℈i. Aquæ f ℥viii. M.

Cold Applications.

148. ℞. Sodii chloridi. Potassæ nitratis. Ammon. hydrochl. āā ℥ii.
Mix, and dissolve in water. (A frigorific mixture, applicable whenever intense cold is required.)

149. ℞. Ammoniæ nitratis. Aquæ āā lb. i.
(In winter, mix equal parts of sn and common salt. In summ equal parts of pounded ice a salt.)

Sedative Fomentations.

150. ℞. Opii ʒii. Aquæ ferventis lb. i.
(To be used as a fomentation.)

151. ℞. Conii fol. exsicc. ʒi. Aquæ lb. iiss.
(Boil down to lb. ii.)

Sedative Ointments.

152. ℞. Plumbi acetatis ʒss. Acidi hydrocyanici dil. ʒiii. Unguent, cetacei ℥iii. M.
(In cases of eczema.)

153. ℞. Potassii cyanidi gr. xii. Ol. amygdal. ʒii. Ung. ceræ alb. ℥ii. M.
(In lichen and prurigo.)

154. ℞. Aconitinæ gr. ii—iv. Alcohol ♏iv. Adipis ℥ss. M.
(Cautiously, in neuralgia.)

155. ℞. Veratriæ gr. iv. Alcohol ♏vi. Adipis ℥ss. M.
(Cautiously, in neuralgia.)

Sedative Liniments.

156. ℞. Ext. belladonnæ ʒii. Aquæ calcis f ℥viii. Ol. amygdal. f ℥iv. M.
(To be applied with a feather in acute eczema and impetigo.)

157. ℞. Ext. belladonnæ ʒii. Ol. Olivæ f ℥vi. M.
(To be applied in the same ma ner in the same diseases.)

Sedative Enemata, &c.

The Enema Opii and Enema Tabaci of the London Pharmacopœia.

As a suppository, the Pilula Saponis Composita.

158. ℞. Camphoræ ʒi. Olei olivæ f ℥ii. M.
(An enema, in the irritation of worms.)

159. ℞. Fol. belladonnæ gr. xii. Aq. fervent. f ℥vi. M.
(In spasm of the urethra.)

160. ℞. Opii gr. ii.
Saponis duri. gr. iii. M.
(A suppository, to allay irritation in the rectum, bladder, or uterus.)

161. ℞. Tinct. opii ♏xl.
Decoct. amyli. f ℥iv. M.
(An opiate enema.)

7. STIMULANTS, IN COMBINATION WITH NARCOTICS, SEDATIVES, AND ANODYNES.

(Including Stimulant and Anodyne Antispasmodics.)

[For the preparations of the London Pharmacopœia belonging to these two classes, see pp. 643 and 653.]

In the form of Draught.

162. ℞. Tr. valerianæ ammon. f ℥ss.
Spirit. æther. comp. f ℥i.
Tinct. hyoscyami f ℥ss.
Mist. camphoræ f ℥i. M.
(A draught, in hysteria.)

163. ℞. Ammon. sesquicarb. gr. x.
Mist. camph. f ℥x.
Syrupi aurantii f ℥ii.
Tinct. opii ♏x—xxx. M.
Succi limonis recentis q. s.

164. ℞. Moschi gr. x.
Ætheris.
Tinct. opii ää ♏xx.
Aq. cinnam. f ℥i. M.
(In the last stage of typhus.)

165. ℞. Mist. camphoræ ℥vi.
Liq. ammon. acet. ℥iii.
Spirit. æther. c.
Tinct. camphor. c.
Syrupi papav. ää ℥i. M.

166. ℞. Liq. opii sedativ. ♏x.
Mist. camph. f ℥i. M.

167. ℞. Tinct. opii f ℥ss.
Mist. camphoræ f ℥i.

In the form of Mixture.

168. ℞. Tinct. opii f ℥i.
Spirit. æther. comp. f ℥ss.
Mist. camph. f ℥vss.
M. (½.)

169. ℞. Mist. camphoræ f ℥v.
Spirit. æther. c. f ℥ii.
Tinct. opii ♏xl.
Pulv. moschi ℈ii.
Spt. ammon. arom. f ℥i.
M. (½.)

170. ℞. Spirit. æther. c. f ℥ii.
Tinct. opii ♏xxx.
T. valerianæ ammon. f ℥ss.
Spirit. cinnamomi. f ℥i.
Aquæ anethi f ℥ivss. M.
(A fourth part for a dose. In gastralgia, flatulence, &c.)

In the form of Pill.

171. ℞. Camphoræ.
Moschi.
Assafœtidæ sing. gr. iii.
Opii. gr. i.
Ol. anethi q. s. M.
Divide into two pills. (One every three hours. In hysteria.)

172. ℞. Castorei ℈i.
Ammon. carb. gr. x.
Pulv. opii gr. i.
Ol. menthæ q. s.
Divide into six pills. (To be taken at short intervals in hysteria.)

173. ℞. Camphoræ gr. viii.
Moschi gr. vi.
Pulveris opii gr. ii.
Mucil. q. s. M.
(Divide into two or four pills.)

174. ℞. Pil. saponis comp. gr. iii.
Pulveris capsici gr. iii.
Olei fœniculi ♏ii.
(Divide into two pills.)

175. ℞. Ammon. sesquicarb. gr. x.
Camphoræ gr. iv.
Ext. hyoscyami gr. iv.
Mucil. acaciæ q. s.
(Divide into four pills.)

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8. EXTERNAL APPLICATIONS (Stimulant and Sedative).

176. ℞. Lin. saponis comp. f ℥iss.
Tinct. opii f ℥ss. M.

177. ℞. Tinct. cantharidis f ℥ss.
Linimenti camphoræ f ℥i.
Liq. ammon. carbon. f ʒi.
Tinct. opii f ʒiii. M.

178. ℞. Olei cajuputi f ℥iss.
Tinct. opii f ℥ss. M.

179. ℞. Extract. conii ℥ii.
Olei anisi f ʒss. M.

180. ℞. Olei tiglii ♏x.
Lin. saponis f ℥i.
Tinct. opii f ℥ss. M.

181. ℞. Gallæ pulveris ʒi.
Camphoræ ʒss.
Tinct. opii f ʒii.
Cerati ℥i. M.

Enemata (Stimulant and Sedative).

182. ℞. Tinct. assafœtidæ f ℥ss.
Tinct. opii f ʒi.
Decoct. hordei Oss. M.
(In flatulent colic, tympanites, &c.)

183. ℞. Camphoræ ℈i.
Olei terebinth. f ℥i.
Olei olivæ f ℥iss.
(In the same.)

TONICS.

Preparations of the London Pharmacopœia, with their Doses.

Mineral Acids.

1. Acidum sulphuricum dilutum - - - - - Dose ♏x to ♏xxx.
2. Acidum nitricum dilutum - - - - - - - - „ ♏x — ♏xxx.
3. Acidum hydrochloricum dilutum - - - - - „ ♏x — ♏xxx.

Preparations of Iron.

4. Ferri ammonio-chloridum - - - - - - - - dose gr. iii to gr. x.
5. Ferri ammonio-citras - - - - - - - - - - „ gr. v — gr. x.
6. Ferri carbonas c. saccharo - - - - - - - - „ gr. x — ʒ ss.
7. Ferri potassio-tartras - - - - - - - - - - „ gr. x — ʒ ss.
8. Ferri sesquioxydum - - - - - - - - - - „ ℈ i — ʒ ss.

9. Ferri sulphas (dried) - - - - - - - - - - Dose gr. v to gr. x.
10. Mistura ferri composita - - - - - - - - - - „ f ʒ i — f ʒ ii.
11. Pilulæ ferri compositæ - - - - - - - - - - „ gr. v — gr. x.
12. Tinctura ferri sesquichloridi - - - - - - - - „ ♏x — f ʒ i.
13. Tinctura ferri ammonio-chloridi - - - - - - „ ♏x — f ʒ ss.

The citrate, and ammonio-tartrate of iron (gr. v to gr. x); the syrup of the citrate and of the iodide of iron (f ʒ ss to f ʒi); the mixed citrate of iron and quinine (gr. iii to gr. v, or more); the syrup of the citrate of iron and quinine (f ʒ ss to f ʒ i) and the tinct. ferri acet. æther. (♏ x to f ʒ ss)—are elegant chalybeate preparations.

Preparations of Zinc.

14. Zinci oxydum - - - - - - - - - - dose gr. ii to gr. v, or more.
15. Zinci sulphas - - - - - - - - - - „ gr. ii — gr. v, or more.

The valerianate of zinc (dose gr. v) is an elegant preparation.

Preparations of Copper.

16. Cupri sulphas - - - - - - - - - - dose gr. ¼ to gr. ii.
17. Cupri ammonio-sulphas - - - - - - „ gr. ½ — gr. iii, or more.
18. Liquor cupri ammonio-sulphatis - - „ f ʒ i — f ʒ ii.

Preparations of Arsenic.

19. Liquor potassæ arsenitis (gr. iv in f ʒ i, or $\frac{1}{24}$ gr. in five drops), dose ♏v, gradually increased.
20. Liquor arsenici chloridi (gr. 1½ in f ʒ i, or $\frac{1}{32}$ gr. in ten drops), dose ♏x, gradually increased.

Preparations of Silver.

21. Argenti oxydum - - - - - - - - - - - - dose gr. ½ to gr. i.
22. Argenti nitras - - - - - - - - - - - - „ gr. ¼ — gr. i.

Preparations of Bismuth.

23. Bismuthi nitras - - - - - - - - - - - - dose gr. x to ℈ i.

Preparations of Bark.

24. Decoctum cinchonæ - - - - - - dose f ʒ i to f ʒ ii.
25. Extractum cinchonæ - - - - - „ ℈ i — ʒ i.
26. Infusum cinchonæ - - - - - - „ f ʒ i — f ʒ ii.
27. Infusum cinchonæ spissatum - - „ f ʒ i — f ʒ ii.
28. Tinctura cinchonæ - - - - - - „ f ʒ i — f ʒ ii.
29. Tinctura cinchonæ composita - - „ f ʒ i — f ʒ ii.
30. Quinæ disulphas - - - - - - - „ gr. i. — gr. v.
31. Aqua anethi, carui, cinnamomi, menthæ (viridis and piperitæ) pulegii, and pimentæ.
32. Balsamum Peruvianum and Tolutanum.
33. Confectio aromatica, aurantii, cassiæ, piperis, and rutæ.
34. Decoctum pareiræ, senegæ, tormentillæ, ulmi, and uvæ ursi.

35. Extractum gentianæ, glycirrhizæ, hæmatoxyli, lupuli, pareiræ, sarsæ liquidum, buchu, taraxaci, and uvæ ursi.
36. Infusum anthemidis, armoraciæ comp., aurantii comp., calumbæ, caryophylli, cascarillæ, cusparia, gentianæ comp., krameriæ, lupuli, quassiæ, rosæ comp., serpentariæ, and valerianæ.
37. Mistura cascarillæ comp., gentianæ comp., guaiaci.
38. Pilulæ galbani comp.
39. Pulvis cinnamomi comp.
40. Syrupus aurantii, cocci, croci, limonum, mori, rhamni, rhœados, rosæ, sarsæ, tolutanus, violæ, and zingiberis.

(The tonic tinctures, wines, spirits, and essential oils are given under the head of Stimulants.) Battley's liquor, cinchonæ cordifolia (dose ♏ v to ʒ ss), is an excellent tonic preparation.

Tonics in the form of Mixture or Draught.

184. ℞. Decocti cinchonæ f ℥vi.
Acid. sulph. dil. f. ʒiss. M.
(Dose ½.)

185. ℞. Decocti cinchonæ f ℥vss.
Extract. cinchonæ ʒss.
Tr. cinch. C. f ℥ss. M. (½.)

186. ℞. Acid. hydrochl. dil. f ʒii.
Infus. calumbæ f ℥vss.
Tinct. lupuli f ℥ss. M. (½).

187. ℞. Acidi hydrochlorici f ℥i.
Aquæ Oj.
Sacchari q. s. M.
(To be used as a common drink.)

188. ℞. Decocti senegæ f ʒviss.
Mist. acaciæ f ℥ss.
Syrupi tolut. f ℥i. M. (½.)
(In bronchitis senilis).)

189. ℞. Quinæ disulphatis gr. xii.
Tinct. aurantii f ℥i.
Infus. rosæ C. f ℥v M. (½.)

190. ℞. Liq. potassæ arsenit. f ʒss.
Decoct. cinchon. f ℥v.
Syr. aur. f ℥i. M. (½.)

191. ℞. Aq. menthæ pip. f ʒvss.
Syrupi aurantii f ℥ss.
Acidi hydrochlorici ♏x.
—— nitrici ♏v. M. (½.)

192. ℞. Zinci sulphatis ℈i.
Infus. quassiæ f ℥v.
Tr. calumbæ f. ʒi. M. (½.)

193. ℞. Zinci sulphatis ʒss.
Decocti cinchonæ f ℥vss.
Tr. gent. f ℥ss. M. (½.)

194. ℞. Magnesiæ ʒi.
Liquoris calcis f ℥vii.
Tr. cardam. C. f ℥i. M. (½.)

195. ℞. Ext. taraxaci ʒi.
Sodæ carb. ʒss.
Tinct. card. comp. f ℥ss.
Infus calumbæ f ℥ii.
Aq. piment. f ʒiiiss. M. (½.)
(In chronic affections of the liver.)

196. ℞. Tr. ferri sesquichlor. f. ʒss.
Infus. quassiæ f ℥vi. M. (½.)

197. ℞. Ferri sulph. ʒss.
Magnes. calcin. ʒi.
Inf. quassiæ f ℥vi. M. (½.)

198. ℞. Confectionis aromat. ʒi.
Spirit. æther. c. f ℥ss.
Mist. camphoræ f ʒvii.
Syr. zingiberis f ℥ss. M. (½.)

Tonics in the form of Pill.

199. ℞. Zinci sulphatis gr. i.
Ext. anthem. gr. iv. M.

200. ℞. Cupri ammon. gr. ii.
Confect. rosæ gr. iii. M.

201. ℞. Cupri sulphatis gr. iii.
Pulv. opii gr. iii.
Confectionis rosæ ʒss. M.
Twelve pills. (One or two for a dose.)

202. ℞. Argenti nitratis gr. i.
Confect. rosæ gr. v. M.
(Twice a-day, in epilepsy.)

203. ℞. Assafœtidæ ʒi.
Pulv. rhei ʒi.
Ext. gentianæ ʒii.
Fellis bovini ʒii. M.
One hundred pills. (Three to be taken three times a-day.)

204. ℞. Ferri sulph. exsicc.
Ext. gentianæ āā ʒss. M.
Twelve pills. (One or two to be taken three times a-day.)

205. ℞. Quinæ disulphat. ℈i
Extracti gentianæ ℈ii. M.
Ten pills. (One three times a-day.)

206. ℞. Argenti nitratis gr. ii.
Ext. lupuli ℈i.
Ext. hyoscyami gr. xii. M.
Eight pills. (One three times a-day.)

207. ℞. Ferri et quinæ citratis.
Ext. gentianæ āā ʒss. M.
Twelve pills. (One or two three times a-day.)

Tonics in the form of Powder.

208. ℞. Sodæ carbonatis gr. v.
Pulv. cinchonæ ℈i.
M. f. pulvis.

209. ℞. Ferri sesquioxydi ℈i.
Pulv. Zingib. gr. v.
M. f. pulvis.

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9. ASTRINGENTS.

Preparations of the London Pharmacopœia.

1.	The mineral and vegetable acids.		
2.	Alumen	Dose	gr. x to ʒ i.
3.	Alumen exsiccatum	„	gr. v — gr. xv.
4.	Creta preparata—		
	Pulv. cretæ comp.	„	gr. v — ʒ i.
	Mist. cretæ	„	f ʒ i — f ʒ ii.
	Confectio aromatica	„	ʒ ss — ʒ i.
5.	Plumbi acetas	„	gr. ii — gr. x.
6.	The sulphates of iron, zinc, and copper.		
7.	Catechu pulvis	„	gr. x — ʒ ss.
8.	Infusum catechu comp.	„	f ʒ i — f ʒ ii.
9.	Tinctura catechu comp.	„	f ʒ i — f ʒ ii.
10.	Tinctura kino	„	f ʒ i — f ʒ ii.

11. Granati pulvis - - - - - - - - - - - - Dose ℈ i to ʒ i.
12. Granati decoctum - - - - - - - - - - „ f ʒ i — f ʒ ii.
13. Granati radicis decoctum - - - - - - - - „ f ʒ i — f ʒ ii.
14. Hæmatoxyli extractum - - - - - - - - - „ gr. x — ʒ ss.
15. Hæmatoxyli decoctum - - - - - - - - - „ f ʒ i — f ʒ ii.
16. Krameriæ pulvis - - - - - - - - - - - „ gr. x — ʒ ss.
17. Krameriæ infusum - - - - - - - - - - „ f ʒiss — f ʒ ii.
(A tincture of krameria, dose ♏ xx to f ʒ i is also in use.)
18. Tormentillæ pulvis - - - - - - - - - - „ ʒ ss. — ʒ i.
19. Tormentillæ decoctum - - - - - - - - - „ f ʒiss — f ʒ ii.
20. Infusum rosæ comp. - - - - - - - - - - „ f ʒ i — f ʒ ii.
21. Confectio rosæ - - - - - - - - - - -
22. Mel rosæ; mel boracis - - - - - - - - „ ʒ i — ʒ ii.
23. Quercûs pulvis - - - - - - - - - - - „ ʒ ss — ʒ ii.
24. Quercûs decoctum - - - - - - - - - - „ f ʒ i — f ʒ ii.
25. Gallæ pulvis - - - - - - - - - - - - „ gr. x — ʒ ss.
26. Gallæ tinctura - - - - - - - - - - - - „ f ʒ ss — f ʒ ii.
27. Gallæ decoctum - - - - - - - - - - - „ f ʒ i — f ʒ ii.
28. Tannic and gallic acids - - - - - - - - „ gr. v — gr. x.

(The tincture of matico [dose ♏ x to f ʒ i] is a valuable astringent.)

Astringents in the form of Mixture or Draught.

210. ℞. Aluminis ʒi.
Infusi rosæ C. f ℥v.
Syr. rhœados f ℥i. M. (½.)

211. ℞. Mist. cretæ f ℥vii.
Syrupi papaveris f ℥i. M.
(Dose, ⅛ after every liquid motion.)

212. ℞. Confectionis aromat. ʒii.
Pulv. ipecac. gr. x.
Mist. cretæ f ℥vi. M. (½.)

213. ℞. Mist. cretæ f ℥v.
Spirit. myristicæ.
Syrupi zingib. āā f ℥ss.
M. (½.)

214. ℞. Cort. querc. ext. cont. ʒiss.
Aquæ ferventis f ℥xx.
Infuse 3 hours, strain, then add—
Pulveris gallæ ʒii.
Tinct. cardamomi f ℥ii.
(A wine-glassful for a dose.)

215. ℞. Aluminis ʒss.
Acidi sulp. dil. f ʒii.
Infus. anthemidis f ℥vss.
Syr. aurantii f ℥ss. M. (½.)

216. ℞. Confect. aromat. ʒii.
Tinct. rhei f ℥i.
Syrupi croci f ℥i.
Aq. menthæ pip. f ℥iv.
M. (½.)

217. ℞. Zinci sulph. ℈i.
Aluminis ʒi.
Infus. rosæ C. f ℥v.
Syrupi rhœados f ℥i. (½.)

218. ℞. Tinct. ferri sesquich. f ʒii.
Infusi quassiæ f ℥vi. M. (½.)

219. ℞. Acidi sulph. diluti f ℥ss.
Infus. rosæ C. f ℥vi.
Syrupi rhœados f ℥ii.
Aquæ destill. f ℥xii.
(To be used as a common drink.)

220. ℞. Fol. uvæ ursi contus. ʒi.
Aquæ ferventis f ℥vii.
Infuse 3 hours, strain, then add—
Tinct. kino.
Syrupi zingib. āā f ℥ ss. M.
(A wine-glassful for a dose.)

221. ℞. Pulv. nucis vomicæ ʒi.
Aquæ f ℥viii.
Boil down to f ℥vi, and add—
Tincturæ opii f ʒi.
(Dose, ½ every two hours. In dysentery.)

222. ℞. Granati baccæ cort. ℥ss.
Lactis vaccini recent. ℔ii.
(Boil down to one-half, and give a wine-glassful every three hours, in chronic diarrhœa.)

223. ℞. Potassæ nitratis ℥ss.
Aceti.
Syrupi āā f ℥ii.
Aquæ destill. f ℥xii. M.
(To be used as a common drink.)

Astringents in the form of Pill.

224. ℞. Cupri sulph.
Opii āā gr. ss.
Confect. rosæ q. s. M.

225. ℞. Pulv. ipecac. gr. ii.
Aluminis gr. vi.
Syrupi papav. q. s. M.
Two pills. (In dysentery.)

226. ℞. Zinci sulphat. gr. ii.
Ext. hæmatox. gr. iii.
Opii gr. ½. M.

227. ℞. Zinci sulphat.
Ferri sulphat.
Ext. gentianæ āā ℈i. M.
Twelve pills. (One or two for a dose.)

Astringents in the form of Powder.

228. ℞. Aluminis.
Pulv. kino.
Pulv. zingib. āā ʒi. M.
(Divide into twelve powders.)

229. ℞. Plumbi acet.
Opii āā gr. vi.
Sacchari albi. ʒi. M.
(Divide into twelve powders.)

External Astringent Applications.

Preparations of the London Pharmacopœia.

1. The dilute mineral and vegetable acids.
2. Linimentum æruginis.
3. Alumen; alumen exsiccatum.
4. Argenti nitras.
5. Creta preparata.
6. Cupri sulphas.
7. Liquor aluminis compositus.
8. Liquor calcis.
9. Liquor plumbi diacetatis.
10. Liquor plumbi diacetatis dilutus.
11. Ceratum plumbi acetatis.
12. Ceratum plumbi compositum.

13. Emplastrum plumbi.
14. Unguentum plumbi compositum.
15. Liquor sodæ chlorinatæ.
16. Unguentum gallæ compositum.
17. Unguentum plumbi compositum.
18. Unguentum zinci.
19. Ceratum calaminæ.

Astringent Liniments and Lotions.

230. ℞. Zinci sulph. ʒi.
Aquæ rosæ.
Aquæ āā Oss. M.

231. ℞. Liq. calcis. f ℥i.
Olei olivæ f ℥ii.
Camphoræ ʒii. M.

(Burns and inflammations of the skin.)

232. ℞. Liq. plumbi diacet. f ʒi.
Acidi acetici.
Spirit. rectif. āā f ℥ss.
Aquæ f ℥ix. M.

Astringent Injections.

233. ℞. Zinci sulph.
Aluminis āā ʒss.
Aquæ destil. Oi. M.

234. ℞. Aluminis ʒi.
Decocti quercûs Oi. M.

235. ℞. Cort. gallarum ℥ss.
Aquæ f ℥xviii.
Boil down to ℥xvi.
(In leucorrhœa.)

Astringent Collyria.

236. ℞. Liq. plumbi diacetat. f ʒss.
Vin. opii f ʒi.
Aquæ rosæ f ℥viii. M.

237. ℞. Aluminis gr. x—℈i.
Aquæ rosæ f ℥iv. M.
(In chronic ophthalmia.)

Astringent Gargles.

238. ℞. Aluminis ʒi.
Acidi sulph. dil. f ʒss.
Tincturæ Myrrhæ f ʒii.
Decocti cinchonæ f ℥vi. M.

239. ℞. Tannin ℈i.
Spirit. rectif. f ℥ss.
Mist. Camphoræ f ℥vss. M.
(Stimulant and astringent.)

Astringent Ointments.

240. ℞. Cretæ ℥i.
Olei olivæ ʒi.
Adipis ℥ss. M.
(For burns and scalds.)

241. ℞. Pulv. gallæ ʒi.
Opii pulv. ℈i.
Adipis ℥i.
(In hæmorrhoids.)

10. DEPRESSANTS.

Preparations of the London Pharmacopœia.

1. Antimonii potassio-tartras	Dose gr. ⅛	to gr. ½ or more.
2. Vinum antimonii potassio-tartratis (gr. i. in f ʒss.)	„ f ʒss	— f ʒii.
3. Pulvis antimonii compositus	„ gr. i	— gr. ii.
4. Pulvis ipecacuanhæ	„ gr. ii	— gr. v.
5. Vinum ipecacuanhæ	„ f ʒss	— f ʒi.
6. Acetum scillæ	„ f ʒi	— f ʒii.
7. Tinctura scillæ	„ f ʒss	— f ʒi.
8. Acetum colchici	„ ℥xx	— f ʒi.
9. Extractum colchici	„ gr. i	— gr. iii.
10. Extractum colchici aceticum	„ gr. i	— gr. iii.
11. Vinum colchici	„ ℥xx	— f ʒi.
12. Enema tabaci	„ f ʒiv	— f ʒvi.
13. Lobeliæ inflatæ pulvis	„ gr. v	— gr. x.
14. Lobeliæ tinctura	„ ℥x	— f ʒss.
15. Lobeliæ tinctura ætherea	„ ℥x	— f ʒss.

(The tincture of lobelia may be given in doses of f ʒi. to f ʒii. as a depressant remedy; but, for this purpose, tartar emetic is greatly to be preferred to all other medicines. James's powder is a preparation often prescribed, but not possessed of any peculiar virtues.)

Depressants in the form of Draught or Mixture.

242. ℞. Vin. Ant. pot. tart. f ʒss.
Aquæ cinnamomi.
Aquæ destill. āā f ʒiiss.
Syrup. simplicis. f ʒss.
M. (¼.)

243. ℞. Tinct. lobeliæ f ʒss.
Aquæ anethi f ʒii.
Aquæ f ʒivss. M. (¼.)

244. ℞. Tr. lobeliæ æthereæ f ʒss.
Tinct. Hyoscyami f ʒii.
Aquæ cinnam. f ʒii.
Aquæ f ʒvss. M. (¼.)

245. ℞. Vin. antim. pot. tart. f ʒi.
Syrupi papaveris f ʒi.
Aquæ f ʒvi. M. (⅛.)

246. ℞. Vin. ipecac. f ʒss.
Aquæ cinnam. f ʒi.
Aquæ f ʒivss. M. (½ or ¼.)

Depressants in the form of Powder.

247. ℞. Antim. pot. tart. gr. i.
Sacch. alb. gr. xxxi. M.
(This powder may be easily divided into fractional parts, and may be given three or four times a-day in doses proportioned to the age, in the inflammatory affections of young children.)

248. ℞. Antim. pot. tart. gr. i.
Pulv. ipecac. ℈i. M.
Divide into eight powders. (One to be taken three or four times a-day.)

249. ℞. Antim. pot. tart. gr. i.
Hyd. c. cretâ gr. xii.
Sacch. alb. ʒi. M.

Divide into eight powders. (One to be taken three or four times a-day. In inflammatory cutaneous affections; in pertussis and bronchitis of children.)

250. ℞. Antim. pot. tart. gr. ii.
Sacchari alb. ʒss. M.
Divide into eight, or into six, powders. (One to be taken every three hours in pneumonia.)

11. EMETICS.

Preparations of the London Pharmacopœia.

There are two classes of emetics; the one consisting of stimulants (p. 643), the other of depressants (p. 667). A certain dose of either class of substances will excite vomiting. The following formulæ comprise medicines of both classes:—

251. ℞. Vini ant. pot. tart. f ℥ss.

252. ℞. Vini ipecacuanhæ f ℥ss.

253. ℞. Pulv. ipecac. ℈i.
Vin. ant. pot. tart. f ℥ss.
Syrupi rhœados f ʒii.
Aq. menthæ sativ. f ʒx. M.

254. ℞. Zinci sulph. ℈i.
Aquæ cinnam. f ℥ss. M.

255. ℞. Cupri sulph. gr. x.
Aquæ ℥iss. M.

256. ℞. Sinapis pulv. ℥ss.
Aquæ f ℥iss.
(In cases of poisoning.)

257. ℞. Ammon. sesquicarb.
Pulv. ipecac. āā ℈i.
Tinct. capsici f ʒii.
Aq. menthæ pip. f ℥ii. M.
(When the sensibility of the stomach is impaired, as in poisoning with opium.)

258. ℞. Tabaci fol. ℥i.
Aquæ tepidæ q. s.
Bruise the leaves, and apply the poultice to the epigastrium. (Must be removed as soon as sickness takes place.)

12. DIAPHORETICS.

There are also two classes of diaphoretics; the one consisting of stimulants (p. 643), the other of depressants (p. 667). Both classes are comprised in the following formulæ:—

Diaphoretics in the form of Draught or Mixture.

259. ℞. Liq. ammon. acet. f ℥iiss.
Mist. camph. f ℥iii.
Syrup. aurantii f ℥ss. M.
(Dose, ½.)

260. ℞. Potassæ nitratis ʒi.
Vin. antim. pot. tart. f ℥ss.
Liq. ammon. acet. f ℥ii.
Syrupi aurantii f ℥i.
Aquæ destill. f ℥ivss. M.
(Dose, ½.)

261. ℞. Ammon. sesquicarb. ʒi.
Syrupi simp. f ℥i.
Aquæ f ℥v. M. (½.)

262. ℞. Potassæ carb. ʒii.
Vint. ant. pot. tart. f ʒiii.
Aquæ destill. f ℥vss. M.
(A sixth part, with a table-spoonful of lemon-juice, for a dose.)

263. ℞. Spirit. æther. nit. f ℥i.
Liq. ammon. acet. f ℥ii.
Syrup. simp. f ℥i.
Aquæ f ℥iv. M. (½.)

264. ℞. Potassæ nitratis ℥ss.
Mist. amygd. f ℥vii.
Syrup. tolutani f ℥i. M.
(Dose, ¼.)

265. ℞. Vin. colch. f ℥ss.
Tinct. opii ♏xl.
Liq. ammon. acet. f ℥ii.
Aquæ f ʒvss. M. (½.)
(Gout and muscular rheumatism.)

266. ℞. Tr. guiaci ammon. f ℥i.
Tinct. opii f ʒi.
Pulv. tragacanth. ʒii.
Aq. cin. f ℥vii. M. (½.)
(Chronic rheumatism.)

Diaphoretics in the form of Powders and Pills.

267. ℞. Pulv. ipecac. gr. x.
(At bedtime in catarrh.)

268. ℞. Pulv. ipecac. C. gr. v.
(Every six hours, with saline draught.)

269. ℞. Pulv. ipecac. gr. i.
Pulv. antim. gr. iii.
Hydrarg. chloridi gr. ½.
Sacchari gr. vi. M.

270. ℞. Hydrarg. chloridi gr. i.
Pulv. Jacobi veri gr. v.
Pulv. ipecac. gr. ii.
Conservæ rosæ caninæ q. s. M.
(Two pills at bedtime.)

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13. EXPECTORANTS.

Preparations of the London Pharmacopœia.

There are also two classes of expectorants; the one stimulant (p. 643), the other depressant (p. 667). Expectorants of both classes are to be found in the following preparations and in the formulæ:—

1. Ammoniacum	Dose	gr. v to ʒi.
2. Mistura ammoniaci	,,	f ℥ss — f ℥iss.
3. Antimonii potassio-tartras	,,	gr. ⅛ — gr. ¼.
4. Vin. ant. pot. tart.	,,	f ʒss — f ʒi.
5. Balsamum Peruvianum	,,	ʒi — ʒii.
6. Balsamum Tolutanum	,,	ʒi — ʒii.
7. Tinctura Tolutana	,,	f ʒss — f ʒi.
8. Benzoin	,,	ʒi — ʒii.
9. Tinctura benzoini comp. (Friars' balsam)	,,	f ʒss — f ʒii.
10. Acidum benzoicum	,,	gr. v — ʒi.
11. Galbanum	,,	gr. x — ʒi.
12. Pulvis ipecacuanhæ	,,	gr. i — gr. iii.

13. Vinum ipecacuanhæ	Dose	♏x	to f ʒss.
14. Pulvis ipecacuanhæ comp.	,,	gr. ii	— gr. v.
15. Pilulæ ipecacuanhæ cum scillâ	,,	gr. v	— gr. x.
16. Lobelia inflata	,,	gr. i	— gr. v.
17. Tinctura lobeliæ	,,	♏x	— f ʒi.
18. Tinctura lobeliæ ætherea	,,	♏x	— f ʒi.
19. Pilulæ conii compositæ	,,	gr. v	— gr. x.
20. Pilulæ scillæ compositæ	,,	gr. v	— gr. x.
21. Pilulæ styracis compositæ	,,	gr. v	— gr. x.
22. Acetum scillæ	,,	f ʒss	— f ʒi.
23. Oxymel scillæ	,,	f ʒi	— f ʒii.
24. Tinctura scillæ	,,	♏x	— f ʒss.
25. Tinctura camphoræ comp.	,,	f ʒss	— f ʒss.

Expectorants in the form of Mixture, Draught, or Linctus.

271. ℞. Tinct. digital. f ʒi.
Oxymel. scillæ f ʒss.
Tinct. opii f ʒss.
Aquæ f ʒvss. M. (½.)

272. ℞. Decoct. senegæ f ʒiii.
Misturæ acaciæ.
Liq. ammon. acet.
Syr. papav. āā f ʒi. M. (½.)

273. ℞. Tinct. camph. comp. f ʒi.
Mist. acaciæ f ʒii.
Syrupi zingib. f ʒi.
Decoct. senegæ f ʒiv. M. (½.)

274. ℞. Mist. ammoniaci f ʒiv.
Vin. antim. pot. tart. f ʒss.
Tinct. camph. comp. f ʒss.
Syrup. tolut. f ʒi. M. (½.)

275. ℞. Vin. ant. pot. tart. f ʒss.
Liq. ammon. acet. f ʒii.
Oxymellis scillæ f ʒii.
Aquæ f ʒiss. M. (½.)

276. ℞. Vini ipecac. f ʒss.
Potassæ carb. ʒii.
Aquæ f ʒvss. M.
(Dose, ½; with a table-spoonful of lemon-juice.)

277. ℞. Sodæ carb. ʒi.
Vini ipecac. f ʒss.
Tinct. opii f ʒi.
Syrupi tolut. f ʒii.
Aquæ f ʒiss. M. (½.)

278. ℞. Spirit. æther. nitric.
Syrupi tolutani āā f ʒi. M.
(A tea-spoonful occasionally when the cough is troublesome.)

279. ℞. Aceti scillæ f ʒss.
Oxymellis ʒiss.
(A tea-spoonful for a dose.)

Expectorants in the form of Pills or Powders.

280. ℞. Pil. scillæ c.
Ext. conii āā ʒss. M.
Twelve pills. (One two or three times a-day.)

281. ℞. Pulv. scillæ.
—— ipecac. āā gr. x.
Ext. conii ʒss. M.
Ten pills. (One three times a-day.)

282. ℞. Pulv. scillæ.
Pulv. ipecac. āā ℈i.
Ext. stramonii gr. v.
Ext. lactucæ gr. xv. M.
Twelve pills. (One four times a-day.)

283. ℞. Antim. pot. tart. gr. iss.
Ext. stramonii gr. iii.
Ext. glycirrhizæ ʒii. M.
Twelve pills. (To be taken as lozenges, three or four times a-day.)

284. ℞. Antim. pot. tart. gr. iss.
Pulv. ipecac. gr. xii.
Pulv. glycirrhizæ ʒi. M.
Divide into twelve powders.

285. ℞. Antim. pot. tart. gr. i.
Pulv. ipecac. gr. x.
Pulv. opii gr. ii.
Pulv. glycirrhizæ ʒi. M.
Divide into ten powders.

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14. DEMULCENTS.

Preparations of the London Pharmacopœia.

1. Acaciæ gummi. Mistura Acaciæ.
2. Tragacantha. Pulvis tragacanthæ compositus.
3. Amygdalæ (dulces). Confectio amygdalæ. Mistura amygdalæ.
4. Glycirrhizæ radix. Pulvis glycirrhizæ. Extractum glycirrhizæ.
5. Linum usitatissimum. Infusum lini compositum.
6. Mel. Amylum. Hordeum. Triticum. Cetaceum. Icthyocolla.
7. Decoctum amyli, Cetrariæ, Cydonei, Hordei, Hordei compositum, Malvæ compositum.
8. Confectio rosæ, Confectio rosæ caninæ.
9. Syrupus althææ, Syrupus tolutanus.

Demulcents in the form of Mixture and Draught.

286. ℞. Camphoræ ʒss.
Potassæ nitr.
Pulv. acaciæ āā ʒi.
Mist. amygd. f ʒvi. M.
(A sixth part for a dose in chordee, strangury, &c., with diluents.)

287. ℞. Cetacei ʒii.
Vitel. ovi unius.
Syrup. tolut.
Aquæ cinnam. āā f ʒi.
Aquæ f ʒiv. M.
(A table-spoonful to be taken at short intervals in bronchitis.)

288. ℞. Potassæ nitr. ʒss.
Mannæ opt. ʒii.
Infus. lini comp. Oii. M.
(A wine-glassful frequently in gonorrhœa.)

289. ℞. Cornu cervi rament. ʒiv.
Micæ panis ʒi.
Aquæ ℔ iii.
Boil down to ℔ ii., strain and add—
Syrup. simp. f ʒi.
Aquæ cinnam. f ʒi. M.
(A wine-glassful frequently in chronic diarrhœa, or during convalescence.)

290. ℞. Althææ offic. ʒi.
Aquæ bullient ℔ ii.
Boil one hour, strain, and add—
Syr. simp. q. s.
(As a common drink in urinary affections.)

291. ℞. Icthyocollæ ʒii.
Aquæ ℔ ii.
Boil down to ℔ i., strain, and add—
Lactis vaccini ℔ ii.
Sacchari ʒi. M.
(A wine-glassful frequently as a demulcent and nutritive.)

15. EMOLLIENTS.

Preparations of the London Pharmacopœia.

1. Decoctum papaveris.
2. Decoctum malvæ compositum.
3. Cataplasma lini.
4. Oleum amygdalæ, lini, olivæ, and papaveris.
5. Unguentum cetacei, sambuci.
6. Cera alba, ceratum cetacei.
7. Sapo, linimentum saponis, emplastrum saponis, ceratum saponis compositum.

292. ℞. Decoct. malvæ comp. Oi.
Liq. plumbi diacet. ʒii. M.
(In several skin diseases, especially lichen, eczema, and impetigo.)

293. ℞. Decoct. dulcamaræ.
Decoct. malvæ co. āā Oss.
(In skin diseases, with irritation.)

294. ℞. Ceræ albæ ℥j.
Ol. amygdalæ f ℥iv.
Aquæ rosæ f ℥iii. M.
(Known as "Galen's cerate.")

295. ℞. Mist. amygdalæ f ℥viii.
Acid. hydrocyam. dil. f ʒi.
(In skin diseases with itching.)

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16. LAXATIVES, APERIENTS, CATHARTICS.

Preparations of the London Pharmacopœia.

		Dose				
1.	Confectio cassiæ	,,	ʒi	to	ʒi.
2.	Manna	,,	ʒi	—	ʒii.
3.	Oleum amygdalæ, olivæ, lini	,,	f ʒi	—	f ʒii.
4.	Sulphur sublimatum and lotum	,,	ʒi	—	ʒii.
5.	Magnesia, and magnesiæ carbonas	,,	ʒi	—	ʒi.
6.	Potassæ sulphas and bisulphas	,,	ʒi	—	ʒii.
7.	Potassæ tartras and bitartras	,,	ʒii	—	ʒi.
8.	Sodæ sulphas and phosphas	,,	℥ss	—	ʒii.
9.	Sodæ potassio-tartras	,,	ʒii	—	ʒi.
10.	Sodii chloridum	,,	℥ss	—	ʒii.
11.	Infusum sennæ compositum	,,	f ʒi	—	f ʒii.
12.	Tinctura sennæ composita	,,	f ʒi	—	f ʒss.
13.	Syrupus sennæ	,,	f ʒii	—	f ʒss.
14.	Confectio sennæ	,,	ʒii	—	ʒi.
15.	Hydrargyrum cum cretâ	,,	gr. i	—	gr. v.
16.	Pilulæ hydrargyri	,,	gr. i	—	gr. v.
17.	Hydrargyri chloridum	,,	gr. i	—	gr. v.
18.	Pulvis rhei	,,	gr. x	—	ʒi.
19.	Pilulæ rhei compositæ	,,	gr. v	—	ʒi.
20.	Extractum rhei	,,	gr. x	—	ʒss.
21.	Infusum rhei	,,	f ʒss	—	f ʒii.
22.	Tinctura rhei composita	,,	f ʒss	—	f ʒi.
23.	Pulvis jalapæ	,,	gr. x	—	ʒi.
24.	Pulvis jalapæ compositus	,,	℈ʒ i	—	ʒi.

25. Tinctura jalapæ	Dose	f ʒ i to f ʒ ii.
26. Extractum jalapæ	„	gr. v — ℈ i.
27. Pulvis scammoniæ	„	gr. x — ℈ i.
28. Pulvis scammoniæ compositus	„	gr. x — ʒ ss.
29. Confectio scammoniæ	„	℈ i — ʒ i.
30. Extractum colocynthidis	„	gr. v — ℈ i.
31. Pilulæ colocynthidis compositæ	„	gr. v — ℈ i.
32. Extractum aloes	„	gr. v — ℈ i.
33. Pulvis aloes compositus	„	gr. x — ʒ ss.
34. Pilulæ aloes compositæ	„	gr. x — ʒ ss.
35. Pilulæ aloes cum myrrha	„	gr. x — ʒ ss.
36. Pilulæ aloes cum sapone	„	gr. x — ʒ ss.
37. Decoctum aloes compositum	„	f ʒ ss — f ℥ ii.
38. Vinum aloes	„	f ʒ ss — f ʒ i.
39. Tinctura aloes	„	f ʒ ss — f ʒ ii.
40. Tinctura aloes composita	„	f ʒ ss — f ʒ ii.
41. Pulvis cambogiæ	„	gr. ii — gr. v.
42. Pilulæ cambogiæ compositæ	„	gr. v — ℈ i.
43. Extractum elaterii	„	gr. ¼ — gr. i.
44. Pulvis helleboris nigri	„	gr. x — ℈ i.
45. Tinctura hellebori	„	f ʒ ss — f ʒ i.
46. Oleum ricini	„	f ℥ ss — f ʒ i.
47. Oleum tiglii	„	♏ i — ♏iii.
48. Oleum terebinthinæ	„	f ℥ ss — f ℥ ii.

Laxatives, Aperients, Cathartics, in the form of Draught.

296. ℞. Magnesiæ sulph. ʒvi.
Mannæ optimæ ʒii.
Aquæ destill. f ʒxii. M.

297. ℞. Pulv. rhei gr. x.
Potassæ tartratis ℥ss.
Infusi sennæ comp. f ʒxii.
Syrupi aurantii.
Tr.cardam.co. āā f ʒii. M.

298. ℞. Sodæ potassio-tart. ℥ss.
Magnesiæ calcinatæ gr. x.
Aq. menthæ pip. f ℥i. M.

299. ℞. Confectionis aromaticæ.
Pulveris rhei āā ℈i.
Tinct. cardamomi.
Syrupi zingiberis āā f ʒii.
Aquæ menth. pip. f ℥i. M.

300. ℞. Magnesiæ sulphatis ℥ss.
Infusi sennæ comp. f ℥iss.
Tinct. sen. comp. f ℥ss. M.

301. ℞. Olei ricini.
Olei terebinth.
Mist. acaciæ āā f ℥ss. M.

Laxatives, &c., in the form of Mixture.

302. ℞. Potassæ tartratis ℥i.
Mannæ optimæ ℥i.
Aquæ destill. f ℥vi. (℥.)

303. ℞. Potassæ tartratis ℥ii.
Infusi sennæ C. f ℥iv.
Tinct. sennæ comp.
Syrupi aurantii āā f ℥i.
M. (℥.)

304. ℞. Infus. rosæ comp. f ℥v.
Magnesiæ sulphatis ℥ss.
Syrupi rosæ f ℥i. M. (℥.)

. ℞. Antim. pot. tart. gr. i.
Magnesiæ sulph. ʒii.
Aquæ destill. f ʒvii.
Syr. aurantii f ʒi. M. (½.)

. ℞. Tinct. sennæ comp. f ʒii.
Vini aloes f ʒii.
Syrupi zingiberis f ʒi.
Aq. menthæ pip. f ʒiii.
M. (½.)

. ℞. Rad. armoraciæ cont. ʒii.
Seminis sinapis.
Radicis valerianæ ää ʒii.
Radicis rhei incisæ ʒss.
use in Oiss of port wine. A wine-
assful as a warm aperient.)

308. ℞. Potass. carbon.
Myrrhæ contusæ.
Aloes socotrinæ ää ʒñ.
Croci ʒi.
Aquæ destill. Oi.
Boil down to ʒxii, and add—
Tinct. cardam.comp.f ʒi
(Two table-spoonfuls for a dose.

309. ℞. Olei ricini f ʒiss.
Vitellum ovi unius.
Mix carefully and add—
Aq. menthæ viridis f ʒv
Syr. aurantii f ʒi. M. (½

Laxatives, Aperients, Cathartics, in the form of Pills.

. ℞. Pulveris rhei ʒss.
Myrrhæ optimæ ℈i.
Olei juniperi ♏i. M.
lve pills. (Two for a dose.)

. ℞. Saponis duri gr. v.
Ext. colocynth. comp.

316. ℞. Aloes socotrinæ gr. iii.
Sapon. duri gr. v. M.
(Divide into two pills.)

317. ℞. Assafœtidæ.
Pulv. rhei ää gr. iv.
Olei anisi ♏ii. M.

323. ℞. Ext. colocynth. comp.
Ext. jalapæ āā ʒss.
Gambogiæ ℈ss.
Olei juniperi ♏iv. M.
(Divide into twenty pills.)

324. ℞. Jalapinæ.
Pulv. rhei āā gr. ii.
Pulv. ipecac. gr. i.
Olei carui ♏i. M.

325. ℞. Olei tiglii ♏i.
Pulv. aloes q. s. M.

326. ℞. Olei tiglii ♏i.
Ext. colocynth. co. gr. v.
Pulv. rhei q. s. M.
(Divide into two pills.)

327. ℞. Olei tiglii ♏ii.
Jalapinæ gr. v.
Pulv. rhei q. s.
Divide into four pills. (One every hour till the bowels act.)

Laxatives, &c., in the form of Powder.

328. ℞. Pulv. rhei ℈i.
Potass. bitartratis ʒi.
Pulv. cinnam. co. gr. v. M.

329. ℞. Pulv. rhei gr. x.
Hydr. chloridi gr. iii.
Pulv. cinnam. co. gr. v. M.
(To be taken in honey.)

330. ℞. Pulv. scammon. co. ℈ss.
Hydrarg. chlor. gr. v. M.

331. ℞. Extract. elaterii gr. ii.
Sacch. pur. ʒi. M.
Eight powders. (One every quarter of an hour till the bowels act.)

Laxatives, &c., in the form of Electuary.

332. ℞. Sulphuris loti.
Potassæ bitartratis āā ʒi.
Pulv. jalapæ ʒi.
Pulv. cinnam. comp. ʒi.
Mellis vel theriacæ q. s.
(A tea-spoonful or dessert-spoonful two or three times a-day.)

333. ℞. Confectionis cassiæ.
Confectionis sennæ.
Potassæ bitartratis āā ℥i.
Pulv. piperis nigri ʒi.
Theriacæ, q. s. M.
(A dessert-spoonful two or three times a-day, in hæmorrhoids.)

PURGATIVE ENEMATA.

Preparations of the London Pharmacopœia.

1. Enema aloes.
2. Enema colocynthidis.
3. Enema terebinthinæ.
4. Enema assafœtidæ.

334. ℞. Infus. anthemidis f ℥x.
Sodæ sulphatis ℥i. M

335. ℞. Ext. colocynth ʒi.
Infus. sennæ f ℥xii. M.

336. ℞. Ext. aloes socotrinæ ʒi.
Lactis communis f ℥vi. M.

337. ℞. Decoct. althææ f. ℥x.
Sodæ sulphatis ℥i. M.

℞. Sodii chloridi ℥ii.
Decocti avenæ Oi. M.

℞. Olei terebinthinæ f ℥i.
Dec. avenæ Oi. M.

340. ℞. Olei ricini f ℥iii.
Potassæ carbonatis ℈i.
Saponis ʒi.
Aquæ ferventis Oi. M.

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17. DIURETICS.

Preparations of the London Pharmacopœia.

Saline substances generally, especially the following:—

Potassæ carbonas	Dose	gr. x to ʒ i.
Potassæ bicarbonas	„	gr. x — ʒ i.
Liquor potassæ effervescens	„	f ℥ i — f ℥ ii.
Potassæ nitras	„	gr. x — ʒ i.
Potassæ chloras	„	gr. x — ℈ i.
Potassæ acetas	„	gr. x — ʒ i.
Potassæ bitartras	„	ʒ ss — ʒ ii.
Sodæ acetas	„	ʒ ss — ʒ ii.
Sodæ potassio-tartras	„	ʒ ss — ʒ ii.
Sodæ sesquicarbonas	„	gr. x — ʒ i.
Liquor sodæ effervescens	„	f ℥ i — f ℥ ii.

Stimulants; among which the following are the chief:—

Tinctura digitalis - - - - - - - -	Dose	℥ x cautiously increased to ℥ xl.
Extractum digitalis - - - - - - - -	„	gr. ½ to gr. i.
Tabacum.		
Acetum scillæ - - - - - - - - - -	„	f ʒ ss — f ʒ i.
Tinctura scillæ - - - - - - - - - -	„	℥ x — f ʒ ss.
Allium (sativum, cepa, and porrum).		

The preparations of colchicum and veratrum; also the preparations of mercury.

Diuretics in the form of Mixture, Draught, &c.

341. ℞. Potassæ acetat. ℈ss—ʒi.
Syrupi simplicis f ℈iii.
Spt. æther. nitrici f ℈i. M.
(A teaspoonful for a dose.)

342. ℞. Potas. acet. ʒii.
Tinct. digitalis f ʒi.
Inf. quassiæ f ℈vi M. (½.)

343. ℞. Potassæ acet. ʒiii.
Infus. digital. f. ℈iii.
Spirit æther. nit. f ℈i.
Liq. ammon. acet. f ℈ii.
M. (½.)

344. ℞. Potassæ bitart. f ℈ss.
Cort. limon. et sacch. q. s.
Aquæ fervent. ℔. ii.
(For a common drink.)

345. ℞. Junip. bacc. contrit. ℈ii.
Sem. anisi contus. ʒii.
Aquæ ferventis Oi M.
Strain, after standing three hours.
(A wine-glassful frequently.)

346. ℞. Inf. armoraciæ co. f ℈vi.
Spirit. æther. nitrici f ℈i.
Syrupi aurantii f ℈i M. (½.)

347. ℞. Copaiba f ℈ss.
Vitellum unius ovi.
Sach. pur. ℈i.
Mix carefully, and add—
Aquæ menthæ virid. f ℈vi.
(Three table-spoonfuls three or four times a-day.)

348. ℞. Tr. ferri sesquichlor. ℥x.
Tinct. hyoscyami ℥x.
(To be taken in water every quarter of an hour till the patient passes urine.)

349. ℞. Acet. colch. f ℈ss.
Potassæ acet. ℈ss.
Aquæ fœnic. f ℈vii.
Spt. junip. co. f ℈ss. M. (½.)

350. ℞. Spartii cacumin. concis. ℈i.
Aquæ Oi.
Boil down to one-half, then add—
Spirit. æther. nit.
Syrup zingiberis ää f ℈i.
(A wine-glassful for a dose.)

351. ℞. Decoct. uvæ ursi.
Liq. calcis ää f ℈iv M.
(A wine-glassful for a dose.)

352. ℞. Infus. buchu f ℈vii.
Spirit. junip. c. f ℈i. M.
(Two table-spoonfuls for a dose.)

553. ℞. Infus. pareiræ f ℈viii.
Acid. nitr. dil. ℥xl.
Tinct. hyoscyami f ℈ii M.
(Three table-spoonfuls for a dose.)

Diuretics in the form of Pill, Powder, &c.

354. ℞. Pil. scillæ comp. ʒi.
Hyd. chloridi gr. v.
Ol. juniperi ♏i. M.
(Divide into twenty pills.)

355. ℞. Pilulæ scillæ comp. gr. v.
Pilulæ hydrarg. gr. iii. M.
(Divide into two pills.)

356. ℞. Pulv. digitalis gr. i—ii.
Hydrarg. chloridi. gr. ¼.
Pil. scillæ co. gr. vi. M.
(Divide into two pills.)

357. ℞. Terebinth. Chiæ gr. v.
Saponis duri gr. v.
Pulv. calumbæ q. s. M.
(Divide into two pills.)

358. ℞. Extracti pareiræ.
Papaveris āā ℈i.
Pulv. glycirrhizæ q. s. M.
(Divide into twelve pills.)

359. ℞. Potassæ nit. gr. x.
Potassæ bitartrat. ℈i.
Pulv. acac. gr. x.
Sacchari ʒss. M.
(The powder to be taken three times a-day in barley-water.)

360. ℞. Extracti uvæ ursi ʒii.
Sodæ carb. ʒss.
Pulv. cinnam. c. ℥ss.
Confect. rosæ caninæ ʒi.
Syrupi q. s. m.
(A table-spoonful of this electuary for a dose. Chronic inflammation of the kidneys and bladder, calculous affections, &c.)

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18. ANTHELMINTICS.

Preparations of the London Pharmacopœia.

1. Purgative medicines.
2. Pulvis stanni - - - - - - - - - - - - Dose ℥ ss to ʒ i.
3. Ferri ramenta - - - - - - - - - - - „ ℈ i — ʒ i.
4. Mucuna pruriens - - - - - - - - - - „ ℈ i — ʒ ss.
5. Pulvis corticis granati - - - - - - - „ ℈ i — ʒ i.
6. Pulvis filicis maris - - - - - - - - - „ ℈ i — ʒ i.

An ethereal extract (dose gr. x to ℈ i) and an essential oil of the male fern (dose ʒ i to ℥ ss) are in use as remedies for tape-worm.

7. Pulv. radicis spigeliæ Marylandicæ - - Dose ʒ i to ʒ ii.
8. Oleum terebinthinæ - - - - - - - - „ ʒ ss — ʒ ii.

The kosso, an Abyssinian plant (dose ℥ ss to ʒ vi, infused in a pint of hot water), is one of the best of our anthelmintics.

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361. ℞. Ol. terebinth. f ℥i.
Decoct. hordei f ℥i M.
(In tænia.)

362. ℞. Ol. terebinth. f ℥ss.
Ol. ricini. f ℥i. M.
(In tænia.)

363. ℞. Mucunæ prurientis ʒi.
Theriacæ ℥i. M.
(A tea-spoonful for a dose. In lumbrici and ascarides.)

364. ℞. Hyd. chloridi gr. vi.
Jalapæ pulv. ℈i. M.

365. Stanni pulv. ʒi.
Electuarii sennæ ʒii.
(A table-spoonful for a dose.)

366. ℞. Pulv. rad. gran. cort. ʒi.
(Four such powders to be taken, one every half-hour. The last to be followed by castor-oil. In tape-worm.)

367. ℞. Semin. santonici.
Semin. tanaceti āā ʒss.
Pulv. valer.
Pulv. jalap.
Potass. sulphat. āā ʒii.
Oxymel. scillæ q. s. M.
(A tea-spoonful of this electuary to be taken night and morning.)

368. ℞. Cort. rad. granati ʒii.
Aquæ ferventis ℔. ii.
(Infuse for twenty-four hours, then boil down to ℔. i. A third part every half-hour. In tænia.)

369. ℞. Decoct. filicis maris ʒiv.
(ʒiss. ad ℔. ii.)
Æther sulph. ʒi. M.
(To be taken in the morning. In tænia.)

(Anthelmintics should be given on an empty stomach, being preceded and followed at a short interval by a full dose of castor-oil.)

ANTHELMINTIC ENEMATA.

370. ℞. Mist. assafœtidæ.
Lactis vacc. āā f ʒiv. M.

371. ℞. Ol. terebinth. f ʒii.
Decoct. amyli f ʒviii. M.

372. ℞. Absinthii.
Tanaceti āā ʒss.
Valer. rad. contrit.
Cort aurant. āā ʒii.
Aquæ fervent. f ʒviii.
(Infuse for an hour, and inject night and morning. In ascarides.)

373. ℞. Tinct. ferri sesquichl. f ʒss.
Aquæ f ʒviii. M.
(In ascarides; a purgative of calomel and jalap being given simultaneously, — *Darwell*, — and camomile tea taken thrice a-day for a fortnight afterwards.)

19. EMMENAGOGUES.

For this class of remedies, see Tonics, especially those containing steel, myrrh, and aloes, in amenorrhœa with anæmia; and Depressants in amenorrhœa with plethora. The stronger emmenagogues, such as savin, are rarely used. A stimulant injection containing ♏xii of liquor ammoniæ to ʒiss of warm milk has been recommended.

20. ANTACIDS.

Preparations of the London Pharmacopœia.

1. Ammonia, and its salts.
2. Potash, and its salts.

3. Soda, and its salts.
4. Lime, chalk, and the preparations containing them.
5. Magnesia, and its salts.
6. Soap.

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374. ℞. Liq. potassæ ℥xx.
Mist. cretæ f ℥i.
Tinct. calumbæ f ʒi. M.

375. ℞. Liq. potassæ f ʒii.
Liq. calcis f ℥iv. M. (℔.)
(In acidity, with tendency to lithic acid deposit in the urine.)

376. ℞. Potassæ carb. ʒi.
Infus. gent. comp. f ℥v.
Tr. cascarillæ f ℥i. M. (℔.)

377. ℞. Magnes. sulphat. ℥i.
Magnes. carb. ʒi.
Aquæ menthæ pip.
Inf. gent. co. āā f. ℥iv. M.
(Two table-spoonfuls for a dose. Antacid and aperient.)

378. ℞. Magnes. carb. ʒii.
Pulv. rhei ℈ii.
Spirit. ammon. arom.
Syrup. zingib. āā f ℥ss.
Aquæ puræ f ℥v. M. (℔.)
(In gastralgia, pyrosis, &c.)

379. ℞. Liq. calcis.
Lactis, vacc. āā f ℥vi. M.
(An ordinary drink.)

380. ℞. Ammon. sesquicarb. ʒss.
Sodæ carb. ʒi.
Inf. quassiæ f ℥vi. M. (℔.)

381. ℞. Sodæ carb. ʒiss.
Pulv. cinnam. comp.
Saponis āā ʒss.
Balsam. Peruv. q. s.
(Forty pills, of which three to be taken two or three times a-day.)

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21. ANTISEPTICS.

Preparations of the London Pharmacopœia.

1. Carbo.
2. Carbo animalis.
3. Cataplasma carbonis.
4. Cataplasma fermenti.
5. Cataplasma sodæ chlorinatæ.
6. Liquor chlorinii.
7. Liquor sodæ chlorinatæ.

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22. ALTERATIVES.

(Including Antisyphilitic and Deobstruent Remedies.)

Preparations of the London Pharmacopœia.

1. Hydrargyrum c. cretâ; pilulæ hydrargyri; hydrargyri iodidum; pilulæ hydrargyri iodidi; hydrargyri biniodidum; hydrargyri ammonio-chloridum; pilulæ hydrargyri chloridi compositæ;

hydrargyri bichloridum; liquor hydrargyri bichloridi; hydrargyri bicyanidum; hydrargyri bisulphuretum; hydrargyri nitrico-oxidum.

2. Iodinium; tinctura iodinii composita; potassii iodidum; liquor potassii iodidi compositus; ferri iodidum; syrupus ferri iodidi; plumbi iodidum; spongia usta.
3. Brominum (dose ♏v. of an aqueous or alcoholic solution, containing one part of bromine in forty parts of water or spirit); potassii bromidum. (Dose, gr. iii—gr. v.)
4. Acidum arseniosum; liq. potassæ arsenitis; liq. arsenici chloridi.
5. (A chloride of gold and sodium, dose gr. $\frac{1}{8}$ to gr. $\frac{1}{2}$, is in use as an alterative.)
6. Acidum nitro-muriaticum.
7. Antimonii oxysulphuretum; antimonii potassio-tartras; vinum antimonii potassio-tartratis.
8. Barii chloridum; liquor barii chloridi.
9. Manganesii sulphas.
10. Decoctum sarsæ; decoctum sarsæ comp.; extractum sarsæ; syrupus sarsæ.
11. Decoctum dulcamaræ.
12. Decoctum chimaphilæ.
13. Extractum taraxaci.
14. Decoctum taraxaci.
15. Oleum morrhuæ.
16. Potassii sulphuretum.

Alteratives in the form of Mixture or Draught.

382. ℞. Hydrarg. bichlorid. gr. ii.
Spirit. rectif. f ℥ss.
Aquæ destil. f ℥iiiss. M.
(A tea-spoonful for a dose.)

383. ℞. Hyd. bichlorid. gr. i.
Tinct. cinchonæ f ℥ii. M.
(A tea-spoonful for a dose.)

384. ℞. Potass. iodidi ʒss.
Inf. quassiæ f ℥vi. M. (½.)
(Secondary syphilis.)

385. ℞. Tinct. iodinii comp. ʒi.
Aquæ destill. f ʒvi. M. (½.)

386. ℞. Ferri iodidi ℈i.
Infus. quassiæ f℥vi. M. (½.)

387. ℞. Syrupi ferri iodidi f ʒi.

388. ℞. Ext. sarsæ ℥ss.
Decoct. sarsæ Oi. M.
(A wine-glassful for a dose.)

389. ℞. Solutionis hydriodatis arsenici et hydrargyri (Donovan) f ℥ss.
Syrupi zingiberis f ℥i.
Aquæ f ℥viss. M.
(A table-spoonful for a dose.)

390. ℞. Stipit. dulcamaræ. cont. ℥i.
Rad. glycyrr. contusæ ʒi.
Aquæ destill. Oiss.
Boil for a quarter of an hour. (A wine-glassful for a dose.)

391. ℞. Acidi nitrici dil. f ʒss.
Acidi hydrochlorici dil. ʒi.
Spirit. æther. nitrici f ʒss.
Syrupi sarsæ f ℥i.
Aquæ f ℥viss. M. (½.)

Decocti sarsæ comp. f℥viiss.
Acidi nitrici dil. f ʒi.
Tinct. hyoscy. f℥ii. M. (½.)

Liq. pot. arsenitis f ʒss.
Infus. quassiæ f ℥v.
Tinct. lupuli f ℥i. M. (½.)

Manganesii sulphatis ʒi.
Magnesiæ sulphatis ℥ss.
Syrupi zingiberis f ʒi.
Aquæ cinnam. f ℥ii.
Aquæ f ℥iv. M. (½.)

395. ℞. Potassii bromidi ℈i.
Sprup. tolut. f ℥i.
Aquæ destill. f ℥vii. M.
(Dose, ½.)

Alteratives in the form of Pill.

Hydrarg. chloridi gr. i.
Ext. conii gr. iii. M.

Pil. hyd. chlor. comp. ʒ ss.
Ext. taraxaci ʒii.
pills. Two to be taken
three times a-day.)

Pilulæ hydrarg. gr. i.
Guaiaci gum.resin. gr. viii.
Mucilaginis acaciæ q. s. M.
ivide into two pills.)

Plumbi iodidi gr. iv.

400. ℞. Ferri iodidi ʒss.
Ext. gentianæ ʒiss. M.
(Divide into twenty-four pills.)

401. ℞. Hyd. iodidi gr. v.
Ext. sarsæ.
Ext. gentianæ ãã ℈i. M.
(Divide into ten pills.)

402. ℞. Hyd. biniodidi gr. i.
Ext. glycirrh. ʒi. M.
(Divide into sixteen pills.)

403. ℞. Auri chloridi

ANTIDOTES TO THE PRINCIPAL POISONS.

ACIDS, MINERAL.—A dilute solution of carbonate of soda, or potash; calcined magnesia or carbonate of magnesia; common chalk, whiting, prepared chalk, or compound chalk powder; in an emergency, the plaster of an apartment, broken up and diffused through water; soap suds, or oil.

ACIDS, VEGETABLE.—Common chalk, whiting, prepared chalk, or compound chalk powder. Carbonate of soda.

ACID, ACETIC.—Magnesia or carbonate of magnesia.

ALKALIES AND THEIR CARBONATES.—Vinegar and water; oil.

ALUM.—Calcined magnesia.

AMMONIA AND ITS CARBONATE.—Vinegar and water.

ANTIMONY, CHLORIDE OF.—Magnesia, carbonate of soda.

ARSENIOUS ACID AND THE SOLUBLE ARSENITES.—No certain antidotes. Hydrated oxide of magnesia; magnesia in a state of fine division; the hydrated sesqui-oxide of iron; or powdered charcoal may be given. Also, a mixture of oil and lime water.

BARYTA, SOLUBLE SALTS OF.—Sulphate of magnesia or of soda.

BARYTA, CARBONATE OF.—Sulphate of magnesia with weak vinegar.

CHLORINE.—Albumen; magnesia.

HYDROCYANIC ACID.—After cold affusion, the mixed oxides of iron diffused through water, and the treatment of asphyxia.

IODINE.—Starch.

IRON, SULPHATE OF.—Carbonate of soda or carbonate of ammonia.

LEAD, SOLUBLE SALTS OF.—Sulphate of soda or magnesia.

LEAD, CARBONATE OF.—Sulphate of magnesia with weak vinegar.

LIME.—Vinegar and water.

MERCURY, SOLUBLE SALTS OF.—White of egg; flour and water.

MURIATIC ACID.—*See* Acids, Mineral.

NITRIC ACID.—*See* Acids, Mineral.

OPIUM AND ITS PREPARATIONS.—No antidote. Treatment by the stomach pump or mustard emetics, cold affusion, and forced exercise. Then strong coffee. In extreme cases, electro-magnetism and artificial respiration.

OXALIC ACID AND THE SOLUBLE OXALATES.—Common chalk, whiting, prepared chalk, or compound chalk powder.

PHOSPHORUS.—No antidote. Magnesia diffused through water, or suspended in mucilage, may be given with advantage.

POTASH AND ITS CARBONATES.—Vinegar and water; oil.

SILVER, NITRATE OF.—Solution of common salt.

SODA AND ITS CARBONATES.—Vinegar and water; oil.

SULPHURET OF POTASSIUM.—Weak solution of chlorine.

SULPHURIC ACID.—*See* Acids, Mineral.

TARTAR EMETIC.—Tincture of bark, kino, or catechu; decoction of cinchona, or of oak bark; strong tea.

ZINC, SULPHATE OF.—A dilute solution of carbonate of soda.

GLOSSARY.

Abscess. (*Abscessus*, from *abscedo*, to escape).
Adynamia. Want of power (α, priv., δύναμις, power).
Acne. Pimple (ἄχνη, scurf).
Amaurosis. Blindness (ἀμαυρὸς, obscure).
Amenorrhœa. Suspended menstruation (α, priv., μὴν, a month, ῥέω, to flow).
Anæmia. Want of blood (α, priv., αἷμα, blood).
Anæsthesia. Loss of the sense of touch (α, priv., αἴσθησις, perception.)
Anasarca. Dropsy of the flesh (ἀνὰ and σὰρξ, the flesh).
Aneurism. Vascular dilatation (ἀνευρύνω, to dilate).
Angina. Choking (ἄγχω, to throttle).
Anuria. Suppression of urine (α, priv., οὐρέω, to pass urine).
Aphtha. Thrush (αφθα, from ἅπτω, to inflame).
Apnœa. Breathlessness (α, priv., πνέω, to breathe).
Apoplexia. The stroke (ἀποπληξία; ἀποπλήσσω, to strike down).
Arachnitis. Inflammation of the arachnoid (ἀράχνη, a spider's web, εἶδος, likeness).
Ascaris. An intestinal worm (ἀσκαρὶς, from ἀσκαρίζω, to jump).
Ascites. Dropsy of the belly (ἀσκίτης, from ἀσκὸς, a sack).
Asphyxia. Apparent death (α, priv., σφύξις, the pulse).
Asthma. Difficulty of breathing (ἄσθμα, from ἀσθμάζω, to gasp).
Atheroma. A species of encysted tumour (ἀθάρη, porridge).
Atrophia. Wasting (α, priv., τροφὴ, nourishment).
Bronchitis. Inflammation of the bronchi (βρόγχος, the windpipe).
Bronchocele. An enlargement of the thyroid gland (βρόγχος, the windpipe, κήλη, a tumour).
Cachexia. Bad habit of body (κακὴ, bad, ἕξις, habit).
Calculus. A little stone (Lat. *calculus*).
Cancer. A malignant disease (*cancer*, a crab).
Carcinoma. Cancer (καρκίνος, a crab).
Cardialgia. Pain in the stomach (καρδία, the heart, ἄλγος, pain).
Carditis. Inflammation of the heart (καρδία, the heart).
Catalepsis. Catalepsy (κατὰλαμβάνω, to seize).
Catarrhus. A cold (κατὰ, down, ῥέω, to flow).
Cephalalgia. Headache (κεφαλὴ, the head, ἄλγος, pain).
Cephalæa. (κεφάλαια, a headache).
Cheloidea. A cutaneous disease (χέλυς, a tortoise, εἶδος, likeness).
Chlorosis. Green sickness (χλωρὸς, green).
Cholera. Flux (χολὴ, bile, ῥέω, to flow).
Chorea. St. Vitus' dance (χορεία, a dancing).
Choroiditis. Inflammation of the choroid (χόριον, skin, εἶδος, likeness).
Colica. Colic (κῶλον, the colon).
Coma. Deep sleep (κῶμα, drowsiness).
Congestion. Fulness of blood (*congestio*, from *congero*, to heap up).

Corneitis. Inflammation of the cornea (*cornu*, a horn).
Cyanosis. Blue disease (*κύανος*, blue).
Cynanche. Quinsy (*κύων*, a dog, *ἄγχω*, to strangle).
Cystitis. Inflammation of the bladder (*κύστις*, a bladder).
Delirium. Wandering (*delirium*, *de*, from, and *lira*, a furrow).[1]
Diabetes. An immoderate flow of urine (*διὰ*, through, *βαίνω*, to pass).
Diarrhœa. A flux (*διὰ*, through, *ῥέω*, to flow).
Dropsy. (*ὕδρωψ*, from *ὕδωρ*, water).
Dysenteria. (*δύς*, with difficulty, *ἔντερον*, the bowels).
Dysmenorrhœa. Difficult menstruation (*δύς*, difficult, *μην*, a month, *ῥέω*, to flow).
Dyspepsia. Difficult digestion (*δύς*, difficult, *πέπτω*, to concoct).
Dysphonia. Difficulty in speaking (*δύς*, difficult, *φωνή*, voice).
Dyspnœa. Difficult respiration (*δύς*, with difficulty, *πνέω*, to breathe).
Dysuria. Painful micturition (*δύς*, with difficulty, *οὐρέω*, to pass urine).
Ecthyma. Cutaneous pustules (*ἐκθύω*, to break out).
Eczema. Running scab (*ἐκζέω*, to boil up).
Elephantiasis. Arabian leprosy (*ἐλεφαντίασις*, from *ἐλέφας*, an elephant).
Emphysema. Air in the cellular membrane (*ἐμφύσημα*, from *ἐμφυσάω*, to inflate).
Empyema. Matter in the pleura (*ἐν*, within, *πύον*, pus).
Encephalitis. Inflammation of the brain (*ἐν*, in, *κεφαλή*, head).
Endemic. Indigenous (*ἐν*, among, *δῆμος*, a people; or *ἐν*, in, *δῆμος*, a district).
Endocarditis. Inflammation of the lining membrane of the heart (*ἔνδον*, within, *καρδία*, the heart).
Enteritis. Inflammation of the bowels (*ἔντερον*, the bowels).
Entozoa. Internal parasitic animals (*ἐντὸς*, within, *ζωή*, life).
Enuresis. Incontinence of urine (*ἐν*, in, *οὖρέω*, to pass urine).
Ephelis. Freckles (*ἐφηλις*, from *ἐπὶ* and *ἥλιος*, the sun).
Epidemic. Prevalent (*ἐπι*, among, *δῆμος*, a people).
Epilepsy. Falling sickness (*ἐπίλεψις*; *ἐπιλαμβάνω*, to seize upon).
Equinia. Glanders (*equus*, a horse).
Erysipelas. St. Anthony's fire (*ἐρυσίπελας*, from *ἐρύω*, to draw, *πέλας*, adjoining).
Erythema. Inflammatory blush (*ἐρύθος*, a blush).
Exanthemata. Eruptions on the skin (*ἐξανθέω*, to blossom).
Febricula. (dim. of *febris*).
Febris. Fever (*ferveo*, to be hot).
Frambœsia. The yaws (*framboise*, Fr., a raspberry).
Gangræna. Gangrene (*γραίνω*, to eat).
Gastralgia. Pain in the stomach (*γαστὴρ*, the stomach, *ἄλγος*, pain).
Gastritis. Inflammation of the stomach (*γαστὴρ*, the stomach).
Gastrodynia. Pain in the stomach (*γαστὴρ*, the stomach, *ὀδύνη*, pain).
Gastro-enteritis. Inflammation of the stomach and bowels (*γαστὴρ*, the stomach, *ἔντερον*, the bowels).

Gengivitis. Inflammation of the gums (*gingivæ*, the gums).
Glossitis. Inflammation of the tongue (γλῶσσα, the tongue).
Gonorrhœa. Purulent discharge from the urethra (γονή, seed, ῥέω, to flow).
Hæmatemesis. Vomiting of blood (αἷμα, blood, ἔμεσις, vomiting).
Hæmaturia. Bloody urine (αἷμα, blood, οὐρέω, to void urine).
Hæmoptysis. Spitting of blood (αἷμα, blood, πτύσις, spitting).
Hæmorrhage. Bleeding (αἷμα, blood, ῥήγνυμι, to burst forth).
Hæmorrhois. Piles (αἷμα, blood, ῥέω, to flow).
Hectic. A remittent fever (ἐκτικός, habitual).
Hemiplegia. Palsy of one side (ἥμισυς, half, πλήσσω, to strike).
Hepatitis. Inflammation of the liver (ἦπαρ, ἥπατος, the liver).
Herpes. Tetter (ἕρπω, to creep).
Hydrocephalus. Water on the brain (ὕδωρ, water, κεφαλή, head).
Hydropericardium. Dropsy of the pericardium (ὕδωρ, water, περί, around, καρδία, the heart).
Hydrophobia. Canine madness (ὕδωρ, water, φόβος, fear).
Hydrorachis. Water on the spine (ὕδωρ, water, ῥάχις, the spine).
Hydrothorax. Dropsy on the chest (ὕδωρ, water, θώραξ, the chest).
Hypertrophy. Excessive nutrition (ὑπερ, over, τροφή, nourishment)
Hypochondriasis. Low spirits (ὑπὸ, under, χόνδρος, cartilage).
Hysteralgia. Pain in the womb (ὑστέρα, the womb, ἄλγος, pain).
Hysteria. Hysterics (ὑστέρα, the womb).
Hysteritis. Inflammation of the womb (ὑστέρα, the womb).
Icterus. Jaundice (ἴκτερος, a yellow bird).
Ichthyosis. Fish-skin (ἰχθυόεις, resembling fish).
Ileus. Obstruction of the bowels (ἰλεός, a den).
Impetigo. Running tetter (Lat. *impetĭgo*, from *impeto*, to assail).
Inflammation. (Lat. *inflammatio*, from *in* and *flamma*).
Influenza. Epidemic catarrh (from *influo*, to abound).
Intus-susceptio. A form of obstruction of the bowels (*intus*, within, and *susceptio*, a taking).
Iritis. Inflammation of the iris (*iris*, a rainbow).
Ischuria renalis. Suppression of urine (ἰσχουρία, suppression of urine; *renalis*, belonging to the kidneys).
Laryngismus stridulus. Spasmodic croup (λάρυγγίζω, to vociferate; *stridulus*, creaking).
Laryngitis. Inflammation of the larynx (λάρυγξ, the larynx).
Lepra. A cutaneous disease (λεπρὸς, scaly).
Leucocythemia. A state allied to anæmia (λευκὸς, white, κύτος, a cell, and αἷμα, blood).
Leucorrhœa. The whites (λευκὸς, white, ῥέω, to flow).
Lichen. A cutaneous disease (λειχὴν, the lichen).
Lumbago. Rheumatism in the loins (*lumbus*, the loins).
Lumbricus. (Ascaris lumbricoides) round worm (*lubricus*, slippery).
Lupus. Noli me tangere (*lupus*, a wolf).
Mania. Furious madness (μαίνομαι, to be furious).
Marasmus. Atrophy (μαραίνω, to wither).
Melancholia. Melancholy (μέλαινα χολή, black bile).

Melæna. Hæmorrhage from the bowels (*μέλαινα*, black).
Melanosis. A morbid product of a black colour (*μέλας*, *μέλανος*, black).
Meningitis. Inflammation of the membranes of the brain, or of the spinal cord (*μῆνιγξ*, a membrane).
Menorrhagia. Flooding (*μὴν*, a month, *ῥήγνυμι*, to break forth).
Mentagra. Chin welk (*mentum*, the chin, *ἄγρα*, seizure).
Metritis. Inflammation of the womb (*μήτρα*, the womb).
Miliaria. Miliary fever (*milium*, a millet seed).
Mimosis inquieta. The nervous state (*μῖμος*, a mimic, and *inquieta*, restless).
Mollities ossium. Softening of the bones (*mollis*, soft).
Molluscum. A skin disease (*molluscum*, the bunch of the tree acer).
Myelitis. Inflammation of the spinal cord (*μυελός*, marrow).
Nephritis. Inflammation of the kidney (*νεφρός*, the kidney).
Neuralgia. Nervous pain (*νεῦρον*, a nerve, *ἄλγος*, pain).
Œsophagitis. Inflammation of the gullet (*οἴσω*, to carry, *φάγω*, to eat).
Ophthalmia. Inflammation of the eye (*ὀφθαλμός*, the eye).
Osteo-malacia. Softening of the bones (*ὀστέον*, a bone, *μαλακία*, softness).
Otitis. Inflammation of the ear (*ὠτὸς*, of the ear).
Palpitatio. Beating of the heart (*palpito*, to throb).
Paracentesis. Tapping (*παρὰ*, through, *κεντέω*, to pierce).
Paralysis. Palsy (*παραλύω*, to relax).
Paraplegia. Palsy of the lower half of the body (*παραπλήσσω*, to strike).
Parotitis. Inflammation of the parotid gland (*παρὰ*, near, *ὠτὸς*, of the ear).
Pellagra. Italian leprosy (*pellis agria*, wild skin; or *φελλός*, the bark of the cork-tree, and *ἄγριος*, wild).
Pemphigus. Vesicular fever (*πέμφιγος*, of a small blister).
Pericarditis. Inflammation of the pericardium (*περὶ*, around, *καρδία*, the heart).
Peritonitis. Inflammation of the peritoneum (*περὶ*, around, *τείνω*, to extend).
Pertussis. Whooping-cough (*pertussis*, a continual cough).
Pestis. The plague (Lat. *pestis*).
Phlebitis. Inflammation of the veins (*φλέψ*, *φλεβός*, a vein).
Phlegmasia dolens. (*φλέγμα*, a burning, and *dolens*, painful).
Phlogosis. Inflammation (*φλόγωσις*, a burning, *φλογόω*, to inflame).
Phrenitis. Inflammation of the brain (*φρὴν*, *φρενός*, the mind).
Phthisis. Consumption (*φθίσις*, from *φθίνω*, to corrupt).
Pityriasis. Dandriff (*πίτυρον*, bran).
Plethoria. Fulness of blood (*πληθώρα*, fulness).
Pleuritis. Inflammation of the pleura (*πλευρὰ*, the side).
Pleurodyne. Pain in the side (*πλευρὰ*, the side, *ὀδύνη*, pain).
Pneumonia. Inflammation of the substance of the lungs (*πνεύμων*, the lung).
Pneumothorax. Air in the pleura (*πνεῦμα*, air, *θώραξ*, the chest).
Podagra. Gout (*ποδός*, of a foot, *ἄγρα*, seizure).

Polypus. (πολὺς, many, ποὺς, a foot).
Porrigo. Scaldhead (*porrigo*, scurf).
Prurigo, Pruritus. (*Prurigo*, itching, *prurio*, to itch).
Psora. The itch (ψώρα).
Psoriasis. Dry scall (ψώρα, the itch).
Puerperal fever. Child-bearing fever (*puer*, a boy, *pario*, to bring forth).
Purpura. Scurvy (*purpura*, a shell-fish yielding a purple dye).
Pyrexia. Fever (πύρεξις, a febrile state).
Pyrosis. Water-brash (πύρωσις, burning).
Rachitis. Rickets (ῥάχις, the back).
Retinitis. Inflammation of the retina (*rete*, a net).
Rheumatism. (ῥεῦμα, a fluxion).
Roseola. Rose-rash (*roseolus*, from *roseus*, rosy).
Rubeola. Measles (*rubeo*, to be red).
Rupia. A cutaneous disease (ῥύπος, filth).
Scabies. The itch (*scabies*, from *scabo*, to scratch).
Scarlatina. Scarlet fever.
Sciatica. Pain in the hip (ἰσχιὰς, from ἴσχιον, the hip).
Sclerotitis. Inflammation of the sclerotic coat of the eye (σκληρὸς, hard).
Scorbutus. Scurvy (Lat. *scorbutus*).
Scrofula. King's evil (*scrofula*, a little pig).
Spermatorrhœa. (σπέρμα, seed, ῥέω, to flow).
Splenitis. Inflammation of the spleen (σπλὴν, the spleen).
Stomatitis. Inflammation of the mouth (στόμα, the mouth).
Struma. King's evil (στρῶμα, a heaping up).
Sycosis. Chin-welk (συκόω, to convert into a fig).
Syncope. Fainting (συγκόπτω, to cut down).
Synochus, Synocha. Forms of continued fever (συνεχὴς, continuous).
Tabes mesenterica. Abdominal consumption (*tabes*, a consumption, μεσεντέριον, the mesentery).
Tænia. Tape-worm (*tænia*, a riband, from τείνω, to stretch).
Tetanus. Locked jaw (τείνω, to stretch).
Tic doloreux. Neuralgia of the face (Fr. *tic*, a convulsive motion, *doloreux*, painful).
Tonsillitis. Inflammation of the tonsils (*tondeo*, to clip).
Tracheitis. Inflammation of the trachea (τραχεῖα ἀρτηρία, rough artery).
Trichuris. Thread-worm (θριχὸς, of the hair).
Trismus. Locked jaw (τρισμὸς, from τρίζω, to gnash the teeth).
Tympanites. Drum belly (τύμπανοειδὴς, like a drum).
Typhus. Continued fever (τυφόω, to stupefy).
Urticaria. Nettle-rash (*urtica*, a nettle).
Vaccina. Cow-pox (*vaccinus*, belonging to a cow).
Varicella. Chicken-pox (dim. of *varus*, a spot).
Variola. Small-pox (dim. of *varus*, a spot).
Zymotic. Contagious and infectious diseases (ζύμωσις, fermentation, from ζύμόω, to ferment).

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